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THE LITTORAL ZONE BENTHIC MACROINVERTEBRATE COMMUNITIES OF 12 ACID SENSITIVE, HEADWATER LAKES IN SOUTH CENTRAL ONTARIO: SPRING VERSUS FALL SAMPLING RESULTS

APRIL 1994

Ontario

Ministry of
Environment
and Energy

ISBN 0-7778-2320-9

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PIBS 2990

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ABSTRACT

The Aquatic Science Section of the Ontario Ministry of Environment and Energy (MOEE) conducts a programme to assess long-term trends in the composition of benthic invertebrate communities in acid-stressed softwater lakes. This report compares results of spring and fall surveys of benthic invertebrates in the littoral zones of twelve headwater lakes. The sampling protocol involved a kick-and-sweep technique to collect benthos at 5 sites in the nearshore area of each lake. In the spring, we sampled lake water chemistry at a mid-lake reference station and at each of the five littoral benthic sites in each lake. We suspect that greater variation in the littoral nutrient concentrations arises because of localized inputs from tributaries as well as isolation from whole-basin water movements in some embayments. The mid-lake reference and littoral stations were also sampled during the fall; however, the littoral sites were only sampled for nutrients.

In this report we summarize and compare the results of the spring and fall surveys. We also summarize the local geological characteristics, climate and vegetation of the region. In addition, we provide maps of the study lakes, description of the sampling sites and an inventory of the fish species present in each lake.

The spring and fall surveys yielded averages of 101 versus 103 species per lake with a range of 78-136 versus 75-134 taxa. In addition the spring and fall surveys resulted in an average of 1990 versus 4112 individual organisms from each lake with a range of 891-3137 versus 2189-8896, respectively. Because of the larger number of individuals in the fall samples we recommend that littoral zone samples should be collected each year in the autumn.

A comparison of the water chemistry revealed that the littoral chemistry was similar to the mid-lake chemistry for all parameters with the exception of the nutrients (i.e., phosphorus and nitrogen).

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INTRODUCTION

In 1988, the Ontario Ministry of Environment (MOE) (now called the Ontario Ministry of Environment and Energy, MOEE) initiated a biomonitoring programme to assess long-term trends in the composition of benthic invertebrate communities in acid-sensitive, softwater Precambrian Shield lakes. This work represents the central Ontario component of the federal-provincial Long Range Transport of Airborne Pollutants (LRTAP) programme that was designed to assess regional changes in the health of inland aquatic ecosystems associated with reductions in sulphur emissions (Shaw et al. 1992). A standard set of survey protocols is currently used by members of the LRTAP programme to permit comparisons among data sets collected from six areas in eastern Canada (Appendix 1). Our goals in the LRTAP programme are: (1) to estimate common species distributions; (2) to compare relative abundances among lakes and among regions; and 3), to detect the response of invertebrates to anticipated changes in water chemistry associated with emission controls.

This report describes the 1988 fall synoptic survey of the littoral benthic macroinvertebrates in 12 lakes and compares these results with the spring 1988 survey. Herein we also describe the physical, chemical, and geological attributes as well as the fish communities of the 12 lakes.

STUDY LOCATION

All of the study lakes are located in south-central Ontario in the county of Haliburton or in the Districts of Nipissing, Muskoka or Parry Sound. The nearest major urban centres are Peterborough (120 km) and Toronto (200 km) to the south and North Bay (130 km) and Sudbury (200 km) to the north (Fig. 1). The lakes are scattered over an area that spans 78°35' to 79°52' in longitude and 45°05' to 45°34' in latitude (Table 1).

Climate and Vegetation

The range in average annual precipitation is 90-110 cm in the Dorset area (30-year record). A total of 240-300 cm of snow falls each year, generally between December 1 and April 10. January temperatures average -10 °C while in July, temperatures average 17.5 °C. Mean annual temperature is about 5 °C. Lakes are generally ice-covered from the first week of December to mid-April.

The study area is situated in the Great Lakes - St. Lawrence forest, a region characterized by white pine (*Pinus strobus*), red pine (*Pinus resinosa*), eastern hemlock (*Tsuga canadensis*) and yellow birch (*Betula alleghaniensis*). Other common species include beech (*Fagus grandifolia*), white oak (*Quercus alba*), sugar maple (*Acer saccharum*), basswood (*Tilia americana*), eastern white cedar (*Thuja occidentalis*), red maple (*Acer rubrum*), red oak (*Quercus rubra*), white birch (*Betula papyrifera*) and poplar (*Populus tremuloides*). Generally, forest stands on the north-facing slopes are coniferous, whereas south-facing slopes are characterized by deciduous trees. Coniferous trees are also common along the shore of each lake.

Geology

The study lakes are situated on the Canadian Shield, an expanse of Precambrian bedrock. The last period of mountain building of the Precambrian period was the Grenville orogeny which formed the Grenville province, a roughly rectangular strip of land 400 km wide and 2000 km long stretching from Georgian Bay to Labrador. The bedrock of the Grenville province is granitic in composition, usually including granitic gneisses and migmatites with marble, quartzite, amphibolite and various igneous intrusives (pegmatites, diorites and metabasics) of less importance (Jeffries and Snyder 1983). During the Pleistocene period, four glacial advances, including the most recent or Wisconsin glaciation, have rounded and polished the rock outcrops of the Grenville province. These glacial advances lowered the relief, scoured many river and lake basins and redeposited glacial debris, including moraines, eskers, outwash sands, gravel and lake sediments. Minor till plains (i.e., continuous moraine deposits >1 m thick) and thin till deposits (i.e., <1 m thick) interrupted by rock ridges are the dominant surficial deposits. Several of the study lakes were submerged beneath glacial Lake Algonquin (about 10,000 years ago) and received sediment-laden glacial meltwater (Girard et al. 1985, Girard and Reid 1990, Reid and Snyder 1986, Appendix 3).

Water Chemistry

The conductivity, major ions and nutrient levels in lakes in this area are typical of nutrient poor, low alkalinity Canadian Shield lakes (Reid et al. 1993). Conductivity ranges from 22 to 33 μS and the alkalinity ranges from 10 to 120 $\mu eq \cdot L^{-1}$. The pH, total phosphorus and the TKN (Total Kjeldahl Nitrogen) ranges are 5.14 - 6.8, 4 - 14 $\mu eq \cdot L^{-1}$ and 160-460 $\mu eq \cdot L^{-1}$, respectively. The sulphate range is 120-170 $\mu eq \cdot L^{-1}$.

METHODS

1. Lake and Site Selection

Twelve (12) lakes were selected from the MOEE lake chemistry database to span a range of alkalinities from <0 $\mu eq \cdot L^{-1}$ to approximately 100 $\mu eq \cdot L^{-1}$. These lakes lie within the area bounded by Parry Sound, Gravenhurst and Algonquin Provincial Park (Figure 1). Six study lakes are located in the historic Lake Algonquin basin, formed after the Wisconsin glaciation (i.e., Blue Chalk, Crosson, Hamer, Harp, Skidway and Young Lakes). The other six lie in the Algonquin/Haliburton Highlands (>340 m above sea level; i.e., Clear, Cradle, Delano, Pincher, Plastic, Westward Lakes). All 12 lakes are small headwater lakes (18 ha to 106 ha) that are subject to high sulphate deposition (0.75 - 1.25 $g \cdot m^{-2} \cdot yr^{-1}$; Neary and Dillon 1988).

In the initial survey in the spring of 1988 (Reid et al. 1993), the field crew circumnavigated each lake and recorded the relative frequencies of various substrate types between the shore and a depth of approximately 1 m. Five sites were then selected to include the predominant substrates; typically rocks (BDR) and boulders (BOU), cobble (COB), pebble (PEB), silt (SLT) and/or sand (CSD) with macrophytes and highly organic detritus and woody debris (LOS).

2. Sampling Procedures

A. Benthos Collections

i) Field Methods

Because of site-specific differences in habitat complexity and sampling efficacy, we collected benthic invertebrates with a kick-and-sweep method standardized to a constant period of time rather than a standard unit of area (e.g., Okland and Okland 1979). Our simple kick-and-sweep method usually collects a large percentage of all species in proportion to their abundance (Elliott 1977). However, the rationale for a fixed time rather than a fixed areal unit has been challenged because the area covered during a fixed time will vary according to the habitat and the water conditions. Consequently, fixed time sampling provides information on relative abundance and species occurrence whereas areal sampling estimates absolute abundance.

Benthic invertebrates were collected for 10 minutes at each site along a varying number of transects (0-1 m depth) located 5 m apart using a standard D-frame, 250 μm mesh net. On each transect the collector waded out to a depth of 1 m. The substrate was gently kicked to disturb and dislodge the surface sediment and associated detritus. The disturbed material was swept up with the net and transferred to a plastic bucket as the collector waded slowly towards the shore.

ii) Laboratory Processing

The samples were sieved through 6250 and 1000 μm mesh to separate the coarse detritus and large invertebrates from the finer material. The >1000 μm fraction and any invertebrates retained by the 6250 μm mesh were separately preserved in 70% ethanol.

After several weeks the sieved fraction was stained to assist in removing the remaining macroinvertebrates from the debris (i.e., using a mixture of 10 g of Eosin B and 10 g Biebrich Scarlet in one litre of water at the rate of 20 mL of the resultant dye solution per 1 litre of sample). The samples were stained for two days, washed, and then sorted without sub-sampling to remove the remaining animals. The resultant samples of benthic invertebrates were identified to the lowest practical taxonomic level. In most instances, the taxonomic resolution was to the genus or species level. Bohdan Bilyj (Biotax) identified all of the invertebrates.

B. Water Chemistry

A comparative sampling program was initiated to assess the potential differences between water chemistry in the mid-lake region and the chemical features of the littoral areas where the benthos was collected. In addition, this chemistry program was designed to assess within lake and seasonal differences to permit inferences with respect to the larger MOEE water quality database that consists of mid-lake water samples only. Prior to the collection of invertebrate samples, water samples were taken for chemical analysis. In each lake, water samples were collected from six sites. These samples consisted of a 0-5 m mid-lake composite and single 0 - 1 m composite samples at each of the five littoral sites. All water samples were taken from a boat to avoid disturbing the bottom sediments in the shallow littoral areas. A total volume of approximately 3 L was collected with a peristaltic pump (Masterflex Portable Sampling Pump, Model 7570) using 1/2 inch i.d. PVC tubing (Tygon R3603). The depth composites were obtained by pumping water into a 8 L polyethylene carboy while the tubing was lowered to the desired depth and raised back to the surface. Coarse particulates in the water were removed by filtering the water through a 80 μm mesh screen positioned at the mouth of the carboy. Each depth was sampled equally by maintaining a constant rate at which the tube was lowered and raised through the water column. We were careful not to disturb the sediment with the tip of the sampling tube at all locations during the pumping procedure.

Once collected, sub-samples of the water were poured into the appropriate bottles for subsequent chemical analysis. The chemical parameters included alkalinity, aluminum, calcium, chloride, conductivity, dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), iron (Fe), potassium (K), magnesium (Mg), sodium (Na), nitrogen, total phosphorus, pH and sulphate (SO_4). The mid lake - littoral area comparison in the fall of 1988 included only the nutrient parameters - phosphorus and nitrogen.

C. Fish Inventory Methods

The Ontario Ministry of Natural Resources (MNR) conducted lake inventory surveys of the study lakes to determine the fish species present in each lake. The fish community was sampled with various types of gear that covered a range of different habitats (Dodge et al. 1987). This equipment included the standard experimental gill nets of various mesh sizes, 4 and 5 foot trapnets, Windermere traps and standard metal minnow traps. Seines were also used to sample fish in nearshore areas. The fish were identified to species and the data were recorded as simple presence or absence.

RESULTS AND DISCUSSION

A. Lake and Site Descriptions

The biomonitoring lakes are all small (18-106 ha) headwater lakes in 4 tertiary watersheds in south central Ontario (Table 1 and Figure 1). The four tertiary watersheds are:

1. 2EB - lakes in this watershed flow through the Moon River or the Go-Home River then into Georgian Bay and Lake Huron (i.e., Harp, Westward, Skidway, Young, Hamer and Pincher Lakes).

2. 2EC - lakes in this watershed flow into the Severn River then into Georgian Bay and Lake Huron (i.e., Crosson and Blue Chalk Lakes).

3. 2HF - lakes in this watershed flow into the Trent System from the Gull River and then to Lake Ontario (i.e., Clear and Plastic Lakes).

4. 2KD - lakes in this watershed flow into the St. Lawrence drainage basin via the Ottawa River and the Upper Madawaska River (i.e., Cradle and Delano Lakes).

The shoreline and nearshore substrate survey was used to identify the predominate substrate types and thereby select 5 littoral sites in each lake (Appendices 2 and 3). Our substrate classifications include detritus - a highly organic flocculent material (LOS); silt (SLT); coarse sand (CSD); pebbles (PEB); cobble (COB); boulders (BOU) and bedrock (BDR). Of the 60 sites, 19 sites are detritus dominated; 9 are detritus and coarse sand; 8 are sand and cobble and 4 sites are dominated by a detritus and cobble combination. The remaining 20 sites have unique combinations of substrate types (Table 2).

B. Chemistry

The water chemistry confirmed the softwater nature of the lakes (i.e., conductivity 20-34 μS) ranging from low DOC (i.e., 1.5 mg $\cdot L^{-1}$; Cradle Lake) to moderately coloured (10.4 mg $\cdot L^{-1}$ Hamer Lake; Table 3). The lakes are extemely sensitive (alkalinity (ANC) < 10 $\mu eq \cdot L^{-1}$) to moderately sensitive (ANC > 100 $\mu eq \cdot L^{-1}$) with respect to the potential for acidification. The nutrient data (total phosphorus and nitrogen) reveal that eleven of the lakes are oligotrophic (Dillon and Rigler 1974), one lake (Hamer 11.5 $\mu eq \cdot L^{-1}$) is the exception with total phosphorus concentrations greater than 10 $\mu eq \cdot L^{-1}$.

Results of the comparison between mid-lake and littoral chemistry show that values for nutrients at the 5 littoral sites vary the most (total phosphorus and total Kjeldahl nitrogen; Figure 2; Table 4). Since these lakes are softwater algae dominated systems, a large part of the scatter in the regression analysis for the nutrients may be attributed to local differences in algal densities and species composition. In addition, variation in the chemistry at some sites may be affected by inputs from nearby streams. Both sampling and lab analytical procedures may also contribute to some of the scatter in the data.

C. Fish Inventory Summary

The MNR fish inventory found 27 species representing 10 taxonomic families in the 12 lakes (Gunn et al. 1988; Table 5). Five of the study lakes support lake trout (*Salvelinus namaycush*) populations (Blue Chalk, Clear, Cradle, Delano and Harp); whereas four lakes support brook trout (*Salvelinus fontinalis*) populations (Crosson, Harp, Plastic and Westward). The survey also found that brook trout are very rare in Plastic Lake. Three lakes contain smallmouth bass (*Micropterus dolomieui*; Harp, Hamer and Young) and one lake (Skidway) has largemouth bass (*Micropterus salmoides*). Clear Lake has the most species (12) and Pincher Lake has only 2 species (common white sucker, *Catostomus commersoni* and pearl dace, *Semotilus margarita*). Neither of these species is abundant. In addition, the lake trout fishery in Delano Lake has declined dramatically over the past 20 years, although the reason for this decline has not been established (Monroe and Hicks 1985).

D. Benthos

The spring and fall kick-and-sweep surveys of the littoral zone invertebrates in the 12 lakes yielded 331 and 272 taxa, respectively, from 31 and 29 taxonomic orders or classes (including the subfamilies of Chironomidae). The number of individual organisms ranged from 891 (Crosson) to 3137 (Pincher), in the spring versus 2189 (Delano) to 8896 (Skidway) in the fall. The mean number of individuals in the spring was 1990 versus 4212 in the fall (Table 6). The number of taxa collected ranged from 78 (Cradle) to 136 (Delano), versus 75 (Pincher) to 134 (Westward) in the fall. The mean number of taxa was 101 in spring and 103 in fall. A summary of the abundance data for each lake is presented in Table 7. The taxonomic summary is provided in Table 8.

The total number of individuals and the total number of taxa from each lake were standardized to Z-scores across the 12 lakes (i.e., a mean of 0.0 and a SD of 1.0) and plotted on bivariate axes to search for groupings among the lakes (Figure 3). Harp, Delano and Hamer had more taxa and more individuals than the average for all lakes in the spring while Hamer and Skidway exceeded the averages in the fall (i.e., 0.0 on the plot). Plastic and Young had a greater number of taxa, but fewer individuals than the average in the spring while Blue Chalk and Westward demonstrated this pattern in the fall. Clear, Cradle and Pincher lakes had a greater number of individuals, but fewer taxa in the spring as opposed to Crosson and Harp in the fall. Lastly, Crosson, Blue Chalk, Westward and Skidway had fewer individuals and fewer taxa than the average in the spring while Clear, Cradle, Delano, Pincher, Plastic and Young were less than the fall averages.

The dominant taxonomic orders for each lake were the Diptera, Amphipoda and Ephemeroptera in both the spring and the fall based on total numbers of individuals (Table 9). The exceptions were Odonata, Trichoptera and Pelecypoda in Harp, Skidway and Young lakes, respectively. Diptera, Trichoptera, Odonata and Ephemeroptera dominate by total number of species (Table 10) in the spring with the addition of Oligochaeta in Westward Lake in the fall.

E. Diversity

Diversity indices combine information on the species richness (number of taxa in a sample) and the number of individuals in each taxon. The Shannon-Wiener index (H') was calculated using data at the generic level of taxonomic resolution (i.e., species were grouped to the genus level). The H' index was computed using the following formula:

$$H' = -\Sigma(n_i/N)\log(n_i/N)$$

where n_i is the number of individuals in genus $_i$ and N is the total number of individuals.

A high diversity index means a large number of genera were found in a sample relative to the number of individuals. A low value implies that the sample is dominated by a small number of genera. H ′ in the spring survey ranged from 1.071 - 1.682 with an average of 1.53. The H ′ in the fall survey ranged from 1.101 - 1.468 with an average of 1.312.

Evenness (J ′) or equitability also refers to the distribution of individuals with respect to the number of genera, but standardized to range from 0 to 1. The formula is $J' = H'/\log^{(S)}$ where s is the total number of genera in the sample. A value of 1.0 implies that each genus has an equal number of individuals, whereas values approaching 0.0 indicate that most of the individuals were from only one genus. The evenness values for the spring study ranged from 0.579 to 0.803 with an average of 0.725 (Table 11). The evenness values for the fall study ranged from 0.563 to 0.753 with an average of 0.691.

The diversity indices were contrasted statistically to compare the benthic communities across the lakes (Zar 1984; Table 12). These formulae involve pair-wise comparisons between H ′ values for each lake. The spring analysis revealed several groups of lakes with similar diversities. Blue Chalk Lake was distinct from all of the other lakes with the lowest diversity index (1.071). Crosson (1.398) and Plastic (1.379) had similar diversities. Westward Lake was intermediate between two different sets of lakes. Westward (1.563) was similar to Clear (1.529) and Young (1.534) and similar to Cradle (1.606) and Hamer (1.62). Finally, Harp (1.656) was similar to Pincher (1.665), Skidway (1.677) and Delano (1.682), which was the lake with the highest diversity.

The fall analysis revealed a narrower H ′ range of 1.101 - 1.468. Clear Lake has the highest diversity (1.468) and is distinct from all of the lakes. Hamer, Harp, Young, Westward, Cradle, Skidway, Delano, Pincher and Plastic are grouped together.

In these surveys, 90 species were collected from only one lake in the spring and 76 species were collected from only one lake in the fall (i.e., these are the rare species; Table 13). Seven rare species were found in the same lake in both spring and fall. The corresponding species and lake are as follows: ISOPODA - *Asellus forbesi* in Skidway, HYDRACARINA - *Arrenurus (Mega) apetiolatus* in Hamer, ODONATA - *Enallagma vesperum* in Skidway, HEMIPTERA - *Sigara (Arcto) penniensis* in Cradle, DIPTERA: Ceratopogonidae Sub-fam Tanipodinae - *Guttipelopia gutttipennis* in Skidway, *Zavrelimyia* sp.1 in Blue Chalk and GASTROPODA - *Physella* (s.str.) *gyrina* in Young. Of the species found in all 12 lakes (Table 14), 12 of the 20 fall species were also reported in all 12 lakes in the spring. These ubiquitous taxa belonged to 10 different taxonomic groups ranging from Oligocheata to Pelecypoda.

F. Spatial and Temporal Variation

The total number of individuals (i.e., the total count) of each major taxonomic group was further examined to quantify the magnitude of spatial and temporal variability. Spatial variation was defined as the difference in the counts from each of the 5 sites in a lake (largely habitat variation; see Table 2). By contrast, temporal variation was defined as the difference between the spring and fall counts for a given lake. For each major taxonomic group in each lake, we calculated a two-way analysis of variance (ANOVA, SAS Institute Inc. 1988) to estimate the sum of squares (i.e., a measure in ANOVA that is analogous to the variance) attributable to spatial and temporal factors. The sum of squares associated with each of these factors was expressed as a percentage of the total variance in the counts of a given taxon in a particular lake. This standardized measure can be used to estimate the relative importance of habitat and seasonal influences on the invertebrate counts. This approach is similar to the calculation of variance components, although it fails to correctly adjust the sums of squares for different levels within each factor (i.e., 5 sites versus 2 times). However, these levels do not change throughout this study, so any biases are incorporated equally throughout the analysis. We used this ANOVA approximation in lieu of variance components because the ANOVA is simpler to calculate and it avoids the problems of negative estimates of the variance components which may arise when the variance for a given factor approaches zero.

Initially separate ANOVAs were calculated using the raw and the log (X+1) transformed data. Both sets of results were compared to verify that the assumptions of the ANOVA were not violated. If these results were similar then we assumed that the ANOVA assumptions were met; however, if the results differed markedly, we assumed that the assumptions were violated and that the results based on the log data were more robust. Although the two analyses generally produced similar results, several cases suggested that the log transformed results were more reliable. As a result, we provide the sums of squares from the ANOVAs using the log data (see Appendix 9).

To compare the results for the different lakes and taxa, we plotted the spatial sum of squares as a percentage of the total variance versus the proportion of the total variance explained by the ANOVA model (Figure 4). The sum of squares associated with the ANOVA model is simply the sum of the spatial and temporal sums of squares. The total variance or the total sum of squares in the sum of the spatial, temporal and error sums of squares. On these plots we added a 1:1 line as a reference to indicate where all of the variation explained by the ANOVA model is attributed to spatial variation. Lakes lying near the 1:1 line for a given taxon indicate that there were large differences in abundance from one site to the next. We propose that this result is an indication that the abundances of that taxon were influenced by differences in habitat (or substrate) characteristics among the 5 sites. Taxa with abundances that exhibit predominantly spatial variation (i.e., large within-lake variability) may not prove useful as indicator species unless site-specific habitat characteristics are taken into account (e.g., by comparing the abundances for only sandy sites).

We also added a 1:2 line to highlight the area in the plots where spatial and temporal variation each account for an equal proportion of the total variation explained by the ANOVA model. Lakes lying near this 1:2 line indicate that the abundance of a particular taxon is affected by both spatial and temporal factors equally. Lastly, lakes lying near the X axis represent taxa with abundances that differ predominantly between samples collected in the spring and samples collected in the fall. The abundances of a taxon exhibiting a large amount of temporal variation are not likely correlated with a particular habitat type. As a result, these taxa may prove to be useful biomonitors of anticipated changes in water quality.

Spatial/temporal-variation plots are presented for 24 of the major taxonomic groups (Figure 4). The relative position of each lake in each plot is indicated by a two-letter lake code if that taxon was found in that lake. For example, a large proportion of the variation in the abundance of the Amphipoda was incorporated into the two-way ANOVA for Plastic, Delano, Young, Hamer and Crosson lakes (i.e., >80% of the total variance). Most of the variation in amphipod abundance in Plastic and Delano lakes was associated with spatial or site-to-site differences in abundance. By contrast, temporal variation (i.e., differences between spring and fall counts) predominated in Young, Hamer and Crosson lakes. Variation in amphipod abundances in Cradle and Pincher lakes was not attributable to spatial or temporal factors because only 30% of the total variation in amphipod abundance was explained by the ANOVA model. As a result, amphipod abundances in Cradle and Pincher lakes differed from site to site, but these differences changed from the spring to the fall. This example indicates that variation in the abundances of a particular taxon can differ considerably from lake to lake. One explanation for these differences arises from the observation that the habitat characteristics of the 5 sites differed more in some lakes than in others (e.g., see Table 2). The consequences of these differences will be assessed further in subsequent reports.

A cursory examination of the spatial/temporal plots (Figure 4) revealed that the spatial factor accounted for most of the variation in the abundances of most taxa. For example, spatial variation exceeded temporal variation in all lakes for the Hirudinea and Lepidoptera. Spatial variability predominated in the majority of the lakes for the Turbellaria, Nematoda, Oligochaeta, Gastropoda, Pelecypoda, Coleoptera, Hemiptera, Megaloptera and several of the Diptera. However, temporal variation was greater in the Amphipoda, Ephemeroptera, Odonata, Trichoptera, Chironomidae, Chironominae, Tanypodinae, Prodiamesinae, Chironomini and Tanytarsini in some lakes. These latter 10 taxonomic groups will probably prove most useful for assessing the impacts of improvements of water quality.

To identify lakes with similar spatial/temporal trends in the 24 taxa, we calculated Spearman rank correlations between all possible pairs of lakes using: 1) spatial variation as a proportion from the ANOVAs; and 2), the analogous temporal variation for all 24 taxa. The resultant lake-by-lake correlation matrices will provide large positive correlations between lakes with similar rankings of the sums of squares for the 24 taxa (Table 15). In the spatial matrix, there were only five significant ($P < 0.05$) correlations among the 66 pair-wise values. Consequently, many of the lakes exhibited unique patterns in the spatial variation of the 24 taxa. The rank order of the spatial variance components for Clear and Crosson, Clear and Skidway, Skidway and Plastic, and Hamer and Harp were positively correlated. Thus, these pairs of lakes exhibited similarities with respect to whether particular taxa exhibited large or small spatial variance components. By contrast, Hamer and Blue Chalk lakes displayed opposite rankings in the spatial variance components resulting in a significant negative rank correlation. In this instance taxa with large spatial sums of squares in Hamer Lake had small spatial sums of squares in Blue Chalk and vice versa (see Appendix 9).

Proportionately more of the rank correlations in the temporal matrix were significant (i.e., 10 of 66 with $P < 0.05$; Table 15). This observation indicates that taxa with large or small differences in abundances between the spring and fall collections exhibited these differences across several lakes. For example, the rank order of the temporal variance components for Blue Chalk were correlated with Plastic and Skidway lakes. Patterns in both Plastic and Skidway lakes were also correlated with Crosson Lake. In addition, Plastic was positively correlated with Delano, Skidway and Westward lakes. The temporal patterns in Harp and Clear lakes were positively correlated, whereas Harp was negatively correlated with Plastic and Westward. From these temporal correlations two groups of lakes are apparent: 1) Blue Chalk, Skidway, Crosson, Plastic, Delano and Westward; and 2) Clear and Harp; plus a set of lakes that illustrate independent patterns: Cradle, Hamer, Pincher and Young.

These groups are also evident in the first two axes from a correspondence analysis of the 24 taxa by 12-lake matrices of the spatial and temporal variance components (Figure 5).

The correspondence analysis of the spatial variation incorporated almost 50% of the total variance in the first two axes. Lakes with positive rank correlations are relatively close together (e.g., Clear, Plastic, Skidway and Crosson) whereas lakes that were negatively correlated are far apart (e.g., Blue Chalk and Hamer). In addition, the correspondence analysis permits the generation of biplots, where scores for the rows and columns of the original matrix can be plotted on the same axes. Thus, the taxa numbered from 1 to 24 are plotted on the same figure with the 12 lakes. Taxa lying near particular lakes tend to exhibit large variance components in that lake. These contributions should be assessed by drawing a vector from the position of a given taxon to the centroid (i.e., 0, 0) in the figure. For example, the Tipulidae (#22) had a relatively large (75%) spatial variance component in Blue Chalk Lake (see Appendix 9).

The correspondence analysis of the temporal variance components also summarized almost 50% of the variation in the first two axes (Figure 5). The cluster of Blue Chalk, Skidway, Crosson, Plastic, Delano and Westward is apparent, but the close rank correlation between Clear and Harp is not. Differences between the rank correlation analysis and the correspondence analysis arise because the correspondence analysis rescales the variance components such that taxa that are abundant in only a few lakes are given high weights. As an example, the Turbellaria (#1) had a large temporal variance component in only Harp Lake, and hence, the #1 lies near the code for Harp Lake (near 0.9, -1.0). Similarly, the Hemiptera (#8) exhibited a large temporal variance component in Cradle Lake. The cluster of six lakes (Blue Chalk to Westward) is based on large temporal variance components for the total Diptera (#13), Chironomidae (#15), Tanypodinae (#16), Chironominae (#19), Chironomini (#20) and the Tanytarsini (#21). Similar interpretations for the other lakes and taxa can be confirmed by comparing Figure 5 with the tabulated data in Appendix 9.

SUMMARY

This report compares the results of benthic collections from the spring and fall of 1988 as part of the LRTAP biomonitoring programme. This synoptic survey of the littoral zone benthos from 12 headwater lakes resulted in the collection of 331 different taxa in the spring and 279 in the fall. In the spring, an average of 1990 organisms from 101 taxa were collected from each lake, whereas an average of 4212 organisms from 103 taxa were collected from each lake in the fall. Diversity indices (H´) calculated for the data at the generic taxonomic level ranged from 1.071 to 1.682 with an average of 1.53 in the spring. By contrast, diversity ranged from 1.101 to 1.468 with an average of 1.312 in the fall. Ninety species were found in only one lake in the spring and 76 in the fall, whereas 13 taxa were collected from all 12 lakes in the spring and 20 taxa in the fall.

An examination of spatial and temporal variation in the counts of the 24 major taxonomic groups revealed that within-lake variation tended to predominate in most taxa. We suspect that these spatial differences are related to differences in the habitat characteristics of the five sites in each lake. Temporal differences (i.e., the spring versus fall comparison) were evident in several taxa: Amphipoda, Ephemeroptera, Odonata, Trichoptera, Chironomidae, Chironominae, Tanypodinae, Prodiamesinae Chironomini and Tanytarsini. These 10 taxonomic groups will likely prove most useful for assessing the impacts of anticipated improvements in water quality. Correlated patterns of temporal variance components revealed two groups of lakes: 1) Blue Chalk, Plastic, Skidway, Crosson, Delano and Westward; and 2) Clear and Harp; plus four lakes with unique patterns: Cradle, Hamer, Pincher and Young. By contrast, the spatial variance components failed to show any large clusters of similar lakes. Further work on the role of habitat differences within lakes appears to be necessary.

Subsequent reports will document the results of the fall surveys that are conducted each year as part of the south-central Ontario component of the LRTAP biomonitoring programme. The following reports are being prepared:

1. results of synoptic surveys conducted in the fall of 1989 and 1990 with comparisons to the fall survey of 1988;

2. statistical analyses of the data reported in 1 with comparisons among years;

3. a quality assurance/quality control (QA/QC) study examining the repeatability of the kick-and-sweep protocol;

4. a study of the chironomid taxa in the 12 lakes with an emphasis on the environmental correlates of the observed patterns in community structure; and

5. an examination of the taxa considered to be potential indicator species for the early warning of the onset of changes in water quality.

ACKNOWLEDGEMENTS

This reports summarizes the 1988 survey of the 12 study lakes that comprise the MOEE component of the LRTAP programme undertaken in collaboration with the Department of Fisheries and Oceans, Environment Canada and the Ontario Ministry of Natural Resources. We thank Greg Mierle for his supervision and direction. We also thank the many students and staff who assisted with the field collections and sample sorting. We thank the MNR personnel who assisted with the fish inventory data including Lori McKay, Lois Deacon and Rick Hawkins. Bohdan Bilyj of Biotax identified the invertebrates. Keith Somers assisted with the data analysis. We also thank Renée Morrison for her assistance with the preparation of this report.

LITERATURE CITED

Cox, E.T. 1978. Counts and measurements of Ontario lakes by watershed unit. Fisheries Branch, Ont. Min. Nat. Res. 114 pp.

Dillon, P.J. and F.H. Rigler. 1974. A test of a simple nutrient budget model predicting the phosphorus concentration in lake water. J.Fish. Res. Board.. Can. 31: 1771-1778.

Dodge, D.P., J.C. Tilt, I. MacRitchie, G.A. Goodchild and D.G. Weldriff. 1987. Manual of instructions: aquatic habitat inventory surveys. Fisheries Branch, Ont. Min. Nat. Res. 248 pp.

Elliott, J.M. 1977. Some methods for the statistical analysis of samples of benthic invertebrates. Second Edn. Freshwat. Biol. Assoc. Sci. Publ. No. 25. The Ferry House, Ambleside, Cumbria. 160 pp.

Girard, R., R.A. Reid and W.R. Snyder. 1985. The morphometry and geology of Plastic and Heney Lakes and their catchments. Ont. Min. Envir. Data Report DR 85/1.

Girard, R. and R.A. Reid. 1990. The morphometric and geologic data for nineteen lakes in the Parry Sound and Nipissing Districts and Haliburton County. Ont. Min. Envir. Data Report DR 90/2.

Gunn, J.M., L.E. MacKay, L.I. Deacon, T.J. Stewart, F.J. Hicks, B.P. Monroe and G.L. Beggs. 1988. Long-term monitoring of fish communities in acid sensitive lakes in Ontario. Lake Reserv. Manage. 4 (1): 123-134.

Jeffries, D.S. and W. Snyder. 1983. Geology and geochemistry of the Muskoka-Haliburton study area. Ont Min. Envir. Data Report DR 83/2.

Monroe, B.P. and F.J. Hicks. 1985. Delano Lake data summary. Algonquin Fisheries Assessment Unit Report. Ont. Min. Nat. Res. 24 pp.

Neary, B.P. and P.J. Dillon. 1988. Effects of sulphur deposition on lake chemistry in Ontario, Canada. Nature. 333: 340-343.

Okland, J., and K.A. Okland. 1979. Use of fresh-water littoral fauna for environmental monitoring: aspects related to studies of 1000 lakes in Norway. pp. 168-183. In: The use of ecological variables in environmental monitoring. Edited by: H. Hytteborn. Nat. Swedish Environ. Prot. Bd., Rep. SNV PM 1151, 348 pp.

Reid, R.A. and W. Snyder. 1986. Geology of Big Porcupine, Clear, Crown, Nunikani and Sherborne catchments (Haliburton County). Ont. Min. Envir. Data Report DR 86/1.

Reid, R.A. and S.M. David. 1990. Crayfish distribution and species composition in the Muskoka and Haliburton lakes. Ont. Min. Envir. Data Report DR 90/1.

Reid, R.A., S.M. David and R.E. Girard. 1993. The littoral zone benthic macroinvertebrate communities of 12 acid sensitive headwater lakes in south central Ontario: lake selection and preliminary sampling results. Ont. Min. Envir. Tech. Report. 33 pp. + appendices.

Shaw, M.A., S. Geiling, S. Barbour, I.J. Davies, E.A. Hamilton, A. Kemp, R. Reid, .M. Ryan, N. Watson and W. White. 1992. The Department of Fisheries and Oceans national LRTAP biomonitoring programme: site locations, physical and chemical characteristics. Can. Tech. Rep. Fish. Aquat. Sci. 1875: 87 pp.

Zar, J.H. 1984. Biostatistical analysis. 2nd edition. Prentice-Hall, Inc. NJ.

Table 1 Physical characteristics and location of the study lakes.

LAKE	SAMPLE DATE	LAT.	LONG.	COUNTY OR DISTRICT	TOWNSHIP	MAP[1]	AREA (ha)	WATERSHED CODES[2]	ELEVATION (m)
BLUE CHALK	02 NOV 88	45 12	78 56	MUSKOKA	RIDOUT	31E2	52.4	2EC15	336
CLEAR	26 OCT 88	45 11	78 43	HALIBURTON	SHERBORNE	31E2	88.4	2HF8	369
CRADLE	26 OCT 88	45 28	78 35	HALIBURTON	LAWERENCE	31E7	17.9	2KD18	472.4
CROSSON	17 OCT 88	45 05	79 02	MUSKOKA	OAKLEY	31E3	56.7	2EC15	312
DELANO	26 OCT 88	45 31	78 36	NIPISSING	CANISBAY	31E10	23.9	2KD1	442
HAMER	20 OCT 88	45 14	79 48	PARRY SOUND	HUMPHREY	31E4	35.2	2EB5	221
HARP	14 OCT 88	45 23	79 07	MUSKOKA	CHAFFEY	31E6	71.4	2EB13	327
PINCHER	27 OCT 88	45 34	78 51	NIPISSING	McCRANEY	31E10	42.1	2EB13	510.1
PLASTIC	12 OCT 88	45 11	78 50	HALIBURTON	SHERBORNE	31E2	32.1	2HF10	379
SKIDWAY	20 OCT 88	45 12	79 52	PARRY SOUND	CONGER	31E4	18.5	2EB2	221
WESTWARD	19 OCT 88	45 29	78 47	NIPISSING	PECK	31E4	63.3	2EB11	429
YOUNG	20 OCT 88	45 13	79 33	MUSKOKA	WATT	31E4	105.9	2EB7	251.5

1– Topographic map number

2– Terrestrial watershed code from Cox 1978.

Table 2 Substrate descriptions of the 60 sites (12 lakes by 5 sites per lake). Substrate types are listed in descending order based on the areal coverage of the predominant substrates (see Appendix 3 for greater detail).

LAKE	SITES 1	2	3	4	5
BLUE CHALK	CSD COB	LOS	LOS	CSD/PEB LOS	CSD
CLEAR	CSD COB	CSD COB	CSD LOS	CSD COB	LOS
CROSSON	COB/PEB CSD LOS	LOS COB CSD	CSD LOS	CSD LOS	LOS COB CSD
CRADLE	LOS CSD COB	LOS	COB/PEB CSD/LOS	LOS	LOS
DELANO	LOS	LOS/COB	LOS	LOS	BOU/LOS
HARP	LOS/CSD	COB CSD	CSD COB	CSD COB	LOS COB PEB CSD
HAMER	LOS	LOS/CSD	BDR	SLT COB/LOS	LOS SLT
PLASTIC	COB LOS CSD	LOS	LOS	COB CSD SLT	LOS COB BOU
PINCHER	COB/LOS	LOS	LOS CSD COB	LOS/COB	LOS
SKIDWAY	LOS	LOS	LOS	LOS	LOS CSD
WESTWARD	LOS CSD	LOS	CSD LOS COB	COB CSD	LOS COB
YOUNG	CSD PEB SLT/LOS	CSD LOS	CSD LOS	SLT LOS	CSD LOS

1–	BDR	Bedrock	COB	Cobble	CSD	Coarse Sand
	BOU	Boulder	PEB	Pebble	SLT	Silt
	LOS	Highly Organic, Flocculent, Fine Particulate Substrate				

Table 3 Mid-lake chemistry for the 12 study lakes.

LAKE	BLUE CHALK	CLEAR	CRADLE	CROSSON	DELANO	HAMER	RP	PINCHER	PLASTIC	SKIDWAY	WESTWARD	YOUNG
DATE	02 NOV 88	26 OCT 88	26 OCT 88	17 OCT 88	26 OCT 88	20 OCT 88	14 OCT 88	27 OCT 88	12 OCT 88	20 OCT 88	19 OCT 88	20 OCT 88
ALKTI(GRAN) ueq.L	90.0	3.0	1.6	14.1	48.6	14.7	76.7	-5.4	9.8	-1.2	42.8	98.0
ALKT(TFE) ueq.L	122.1	39.4	37.8	46.8	80.5	45.4	108.0	30.9	43.0	26.1	74.7	131.5
Al ug.L	1	13	4	32	27	160	12	52	9	81	3	7
Ca mg.L	2.7	2.3	1.9	2.3	2.9	2.8	2.9	1.7	2.0	1.4	2.2	2.9
Cl mg.L	0.5	0.4	0.3	0.4	0.0	1.7	1.2	0.0	0.4	0.4	0.4	0.3
COND25 uS.cm	27.0	25.4	22.1	25.5	31.2	30.9	34.0	21.8	22.7	20	22.7	30.1
DIC mg.L	1.44	0.30	0.29	0.49	1.06	0.73	1.09	0.46	0.46	0.59	0.71	1.29
DOC mg.L	1.9	1.5	1.6	3.6	5.3	10.4	3.5	2.8	1.8	4	1.6	3.5
Fe ug.L	20	450	350	100	84	64	32	120	80	180	20	330
K mg.L	0.40	0.35	0.31	0.33	0.42	0.50	0.59	0.37	0.22	0.31	0.37	0.59
Mg mg.L	0.75	0.55	0.48	0.62	0.96	0.64	0.94	0.44	0.46	0.44	0.56	0.76
Mn ug.L	100	97	110	19	48	6	6	35	42	39	5	180
Na mg.L	0.84	0.48	0.46	0.65	0.78	0.81	1.28	0.56	0.52	0.66	0.54	0.95
NH4 ug.L	27	3	5	11	8	57	6	23	16	18	19	9
NO3 ug.L	5	0	0	11	30	30	3	7	4	15	13	5
TKN ug.L	190	140	200	160	260	500	210	230	150	270	130	210
pH	6.67	5.88	5.84	5.94	6.20	5.34	6.72	5.29	5.91	5.12	6.57	6.88
SO4 mg.L	6.4	8.2	7.0	8.4	8.8	6.6	7.5	6.6	6.6		6.5	6.8
TOTAL PHOSPHORUS ug.L	3.2	2.8	3.4	6.5	9.6	11.5	6.7	3.7	4.5	5.7	1.8	8.3

Table 4 Mid-lake - Littoral zone chemistry comparison for ammonia, nitrate, total Kjeldahl nitrogen and total phosphorus.

LAKE	SITE	NH4	NO3	TKN	TP	LAKE	SITE	NH4	NO3	TKN	TP
BLUE CHALK	MID LAKE	27	5	190	3.2	HARP	MID LAKE	6	3	210	6.7
	1	30	7	240	4.0		1	5	3	200	2.4
	2	40	9	300	10.1		2	5	3	200	6.2
	3	24	6	190	3.5		3	5	4	220	4.6
	4	27	6	190	6.3		4	6	0	220	5.3
	5	15	4	170	4.8		5	6	0	200	7.1
	AVG	27	6	218	5.7		AVG	5	2	208	5.1
	STD	8	2	47	2.4		STD		2	10	1.6
	U95	37	8	276	8.7		U95	6	4	220	7.1
	L95	-38	-9	-296	-8.4		L95	4.8	-0.1	195.8	3.1
CLEAR	MID LAKE	3	0	140	2.8	PLASTIC	MID LAKE	16	4	150	4.5
	1	5	0	110	2.4		1	12	4	150	6.0
	2	3	0	140	3.4		2	11	3	150	4.4
	3	2	0	120	2.6		3	9	2	140	4.0
	4	3	10	140	2.3		4	10	3	180	4.5
	5	5	0	130	5.0		5	9	2	150	4.7
	AVG	4	2	128	3.1		AVG	10	3	154	4.7
	STD	1	4	12	1.0		STD	1	1	14	0.7
	U95	5	7	142	4.3		U95	12	4	171	5.5
	L95	2	-3	114	1.9		L95	9	2	137	3.9
CRADLE	MID LAKE	5	0	200	3.4	PINCHER	MID LAKE	23	7	230	3.7
	1	3	0	150	5.4		1	22	7	190	6.1
	2	3	0	120	5.8		2	22	7	190	5.7
	3	3	0	140	4.9		3	22	7	200	6.0
	4	3	0	120	2.5		4	20	7	190	4.4
	5	4	0	140	5.2		5	23	8	220	5.0
	AVG	3	0	134	4.7		AVG	22	7	198	5.4
	STD		0	12	1.2		STD	1	0	12	0.7
	U95	4	0	149	6.2		U95	23	8	212	6.2
	L95	3	0	119	3.3		L95	21	7	184	4.6
CROSSON	MID LAKE	11	11	160		WESTWARD	MID LAKE	19	13	130	1.8
	1	10	12	130			1	19	14	140	
	2	12	12	190			2	22	16	140	
	3	11	12	240			3	21	16	130	
	4	10	13	230			4	16	11	110	
	5	8	10	100			5	16	14	110	
	AVG	10	12	178			AVG	19	14	126	
	STD	1	1	55			STD	2	2	14	
	U95	12	13	246			U95	22	16	143	
	L95	9	11	110			L95	16	12	109	
DELANO	MID LAKE	8	30	260	9.55	YOUNG	MID LAKE	9	5	210	8.3
	1	7	30	240	7.95		1	6	5	210	5.5
	2	7	30	250	10.4		2	9	0	210	8.1
	3	7	30	250	9.05		3	10	0	200	7.0
	4	7	30	240	8.3		4	9	0	270	5.5
	5	8	30	240	8.9		5	9	0	220	7.5
	AVG	7	30	244	8.9		AVG	9	1	222	6.7
	STD		0	5	0.8		STD	1	2	25	1.1
	U95	8	30	250	10.0		U95	10	3	253	8.0
	L95	6.70	30.00	237.92	7.88		L95	7	-1	191	5.4
HAMER	MID LAKE	57	30	500							
	1	54	40	450							
	2	58	35	500							
	3	55	40	460							
	4	54	35	460							
	5	53	45	460							
	AVG	55	39	466							
	STD	2	4	17							
	U95	57	44	488							
	L95	52.66	34.36	444.36							

Table 5 Fish inventory for the 12 lakes.

SCIENTIFIC NAMES	DFO_CODE		LAKES NAME[1]											
			BC	CL	CR	CN	DO	HR	HP	PC	PN	SY	WD	YG
Family Salmonidae														
Subfamily Salmoninae														
Salvelinus fontinalis	163	Brook Trout				P			P	P			P	
Salvelinus namaycush	166	Lake Trout	P	P	P		P		P					
Hybrid		Hybrid			P									
Subfamily Coregoninae														
Coregonus artedii	142	Cisco							P					P
Family Osmeridae														
Osmerus mordax	138	Rainbow Smelt			P					P				
Family Catostomidae														
Catostomus commersoni	26	White Sucker	P	P		P	P		P	P	P	P	P	P
Family Cyprinidae														
Phoxinus eos	71	Northern Redbelly Dace	P	P	P		P			P			P	
Couesius plumbeus	44	Lake Chub		P									P	
Hybognathus hankinsoni	47	Brassy Minnow	P											
Notemigonus crysoleucas	53	Golden Shiner	P			P				P				
Notropis cornutus	60	Common Shiner		P			P						P	
Notropis heterodon	62	Blackchin Shiner	P											
Notropis heterolepis	63	Blacknose Shiner				P							P	
Pimephales notatus	73	Bluntnose Minnow		P										P
Pimephales promelas	74	Fathead Minnow		P									P	
Rhinichthys atratulus	75	Blacknose Dace		P										
Semotilus atromaculatus	78	Creek chub	P	P	P	P	P			P				
Semotilus margarita	80	Pearl Dace		P	P		P			P	P			
Family Ictaluridae														
Ictalurus nebulosus	173	Brown Bullhead	P			P		P		P				
Family Cadidae														
Lota lota	81	Burbot (ling)	P						P					
Family Gasterosteidae														
Culaea inconstans	84	Brook Stickleback			P		P						P	
Family Centrarchidae														
Ambloplites rupestris	90	Rock Bass								P				
Lepomis gibbosus	94	Pumpkinseed	P	P		P				P		P		
Micropterus dolomieui	99	Smallmouth Bass						P	P					P
Micropterus salmoides	100	Largemouth Bass										P		
Family Percidae														
Perca flavescens	122	Yellow Perch		P		P		P		P		P		P
Etheostoma exile	117	Iowa Darter												P

1– Lakes: BC = Blue Chalk, CL = Clear, CR = Cradle, CN = Crosson, DO = Delano, HR = Hamer, HP = Harp, PC = Plastic, PN = Pincher, SY = Skidway, WD = Westward, YG = Young

Table 6 Taxonomic richness and abundance data for the spring and fall benthic invertebrate collections.

LAKE	TOTAL # OF TAXA		TOTAL # OF INDIVIDUALS	
	SPRING	FALL	SPRING	FALL
BLUE CHALK	92	112	1610	3553
CLEAR	94	100	2076	2851
CRADLE	78	88	2420	3190
CROSSON	91	101	891	4915
DELANO	136	94	2940	2189
HAMER	103	111	2299	7923
HARP	110	98	2008	4335
PINCHER	93	75	3137	2819
PLASTIC	123	98	1067	3306
SKIDWAY	83	122	2053	8896
WESTWARD	96	134	1901	3328
YOUNG	108	102	1512	3246
MEAN	101	103	1990	4213
RANGE	78-136	75-134	891-3137	2189-8896

Table 7 Summary of the number of individuals collected in each lake (using 2-letter lake codes) at the order or sub-family taxonomic level. "S" denotes the spring data whereas "F" heads the fall data columns.

	BC	BC	CL	CL	CR	CR	CN	CN	DO	DO	HR	HR	HP	HP	PN	PN	PC	PC	SK	SK	WD	WD	YG	YG
TAXONOMIC NAME	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F
TURBELLARIA			1					1	4			1		27								8		
NEMATODA	7	14	6	5				2	4	1	2		4		2	3		1			2	2		4
OLIGOCHAETA	33	42	75	86	16	21	41	23	26	8	29	64	81	61	58	27	57	28	18	8	34	89	31	23
HIRUDINEA	1	1	4	3	2	5	12	8	5	3		2	3	3	9	4	3	8	2		5	16		9
ISOPODA																			37	115				
AMPHIPODA	596	1341	186	1056	376	1055	97	1811	430	683	159	3617	360	2095	307	448	99	343	205	311	650	1312	439	1980
DECAPODA		1	1			2															1		1	1
HYDRACARINA	3				1		9	1	50		15	41	24					2	4	5	2		2	1
COLLEMBOLA	1				3				1						1		1				1			
EPHEMEROPTERA	150	598	530	541	479	355	410	807	580	768	714	1672	242	324	549	451	89	263	428	1582	481	417	230	118
ODONATA	33	83	11	55	50	26	33	324	105	136	99	314	87	346	33	31	21	118	83	264	5	31	40	67
PLECOPTERA		1											4	1			9					2	15	1
HEMIPTERA	1			3	21	4	5	1	5	1	12		6	1	15	6	4		7	26	4	7		
MEGALOPTERA	2		4	25			4	7		1	35	2	1	3	1	1	5		27	12		1	4	1
NEUROPTERA					1																			
TRICHOPTERA	19	76	28	90	53	36	18	142	64	38	130	406	29	77	97	71	29	113	87	496	26	38	35	52
LEPIDOPTERA	1	2	6	3		2	4						1	4	1		8	1		4	3	3		2
COLEOPTERA	37	78	88	25	13	9	17	112	139	18	4	4	25	29	19	8	6	1	7	27	36	25	25	11
DIPTERA TOTAL	704	1305	1032	872	1362	1646	227	1627	1476	499	1015	1521	1039	1044	1965	1652	666	2225	1113	6040	505	1155	657	649
DIPTERA:Ceratopogonidae	101	62	26	80	53	19	22	35	28	14	154	389	109	59	86	57	77	70	91	414	53	124	36	21
DIPTERA:Chironomidae	601	1232	1005	790	1305	1627	203	1592	1444	485	851	1129	917	984	1868	1594	553	2151	1020	5620	447	1024	617	625
Subfam.-Podonominae		1		1				1					4				2							
Subfam.-Tanypodinae	435	544	118	151	493	222	37	792	514	218	301	475	461	456	372	445	119	482	169	956	126	262	249	327
Subfam.-Diamesinae																								3
Subfam.-Prodiamesinae	1	3	1	18		1							3	24							4	5	1	3
Subfam.-Orthocladiinae	47	143	326	54	26	140	44	236	187	26	281	319	184	69	138	217	247	381	149	575	42	41	187	5
Subfam.-Chironominae	118	541	560	566	786	1264	122	626	743	241	269	335	265	435	1358	932	185	1288	702	4089	275	716	180	287
Tribe-Chironomini	56	346	146	494	580	882	108	351	508	175	235	306	232	293	642	698	124	885	610	3822	123	376	76	231
Tribe-Tanytarsini	62	195	414	72	206	382	14	275	235	66	34	29	33	142	716	234	61	403	92	267	152	340	104	56
DIPTERA:Tabanidae	1								1		1	1			1	1			1	1				1
DIPTERA:Tipulidae	1	8		1			2				8	1	11	1			14	3		3				2
DIPTERA:Culicidae																								
DIPTERA:Misc.		3	1	1					3		1	1	2		10		18	1	1	2	4	7	4	
DIPTERA-indent./terrestrial forms																	4			1	1	8		
DIPTERA:Chaoboridae					4																			
GASTROPODA	1	3	6	2	1	3		47	38	2		9	34	92		2	1	10			2	5	21	96
PELECYPODA	21	8	98	.85	42	26	14	4	13	31	85	270	68	228	80	115	69	193	35	6	144	217	12	231
TOTAL INDIVIDUALS	1610	3553	2076	2851	2420	3190	891	4915	2940	2189	2299	7923	2008	4335	3137	2819	1067	3306	2053	8896	1901	3328	1512	3246

Table 8 Summary of the number of taxa collected in each lake at the order or sub-family taxonomic level.

TAXONOMIC NAME	BC S	BC F	CL S	CL F	CR S	CR F	CN S	CN F	DO S	DO F	HR S	HR F	HP S	HP F	PN S	PN F	PC S	PC F	SY S	SY F	WD S	WD F	YG S	YG F
TURBELLARIA			1					1	1			1		1								1		
NEMATODA	2	2	1	2				1	2	1	2		3		1	2		1			1	1		2
OLIGOCHAETA	7	4	4	4	3	2	3	4	8	3	2	6	7	5	4	4	5	6	1	3	3	6	5	5
HIRUDINEA	1	1	2	2	1	2	2	3	2	2		2	1	2	4	2	2	3	1		4	6		4
ISOPODA																			1	1				
AMPHIPODA	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2
DECAPODA		1	1			1															1		1	1
HYDRACARINA	1				1		2	1	8		4	8	4					1	1	2	2		2	1
COLLEMBOLA	1				1				1						1		1				1			
EPHEMEROPTERA	7	8	6	5	5	5	7	7	5	5	4	5	5	7	2	2	3	3	3	4	6	5	7	8
ODONATA	6	9	6	10	5	9	8	14	12	13	11	16	6	10	6	6	7	13	11	15	3	4	4	8
PLECOPTERA		1											1	1			1					1	1	1
HEMIPTERA	1			1	5	3	3	1	3	1	7		3	1	2	3	4		5	5	2	2		
MEGALOPTERA	1		1	1			2	2		1	1	1	1	1	1	1	1		2	2		1	1	1
NEUROPTERA					1																			
TRICHOPTERA	11	12	10	13	12	15	9	14	17	13	13	13	14	12	14	10	12	14	9	20	7	11	14	12
LEPIDOPTERA	1	1	2	1		1	1						1	1	1		2	1		1	3	1		1
COLEOPTERA	3	5	5	3	3	1	4	3	7	3	4	2	4	4	3	2	4	1	2	7	5	4	7	5
DIPTERA TOTAL	45	61	50	51	45	44	46	43	61	45	52	50	49	42	51	37	72	46	44	58	50	82	57	43
DIPTERA:Ceratopogonidae	5	11	9	8	7	8	5	8	8	6	8	8	12	8	6	6	17	7	6	7	8	9	7	5
DIPTERA:Chironomidae	38	48	40	41	37	36	39	35	50	39	40	39	30	33	42	30	47	36	36	47	38	43	47	36
Subfam.-Podonominae		1		1				1					1				1							
Subfam.-Tanypodinae	8	8	6	7	5	5	6	7	8	8	6	6	8	7	6	5	8	6	6	7	5	7	7	6
Subfam.-Diamesinae																								1
Subfam.-Prodiamesinae	1	1	1	1		1							1	1							1	1	1	1
Subfam.-Orthocladiinae	10	12	9	8	9	6	13	5	14	7	10	8	20	5	12	5	18	7	8	10	10	10	19	4
Subfam.-Chironominae	19	26	24	24	23	24	20	22	28	24	24	25	26	20	24	20	20	23	22	30	22	25	20	24
Tribe-Chironomini	13	22	19	21	20	21	16	19	23	21	21	22	20	17	18	16	16	19	20	27	17	20	15	20
Tribe-Tanytarsini	6	4	5	3	3	3	4	3	5	3	3	3	6	3	6	4	4	4	2	3	5	5	5	4
DIPTERA:Tabanidae	1								1		1	1			1	1			1	1				1
DIPTERA:Tipulidae	1	1		1			2				2	1	5	1			3	2		1				1
DIPTERA:Culicidae																								
DIPTERA:Misc.		1	1	1					2		1	1	2		2		4	1	1	1	3	3	3	
DIPTERA-indent./terrestrial forms																	1			1	1	1		
DIPTERA:Chaoboridae					1																			
GASTROPODA	1	3	1	1	1	1		3	3	2		1	4	4		1	1	1			1	2	3	5
PELECYPODA	2	2	2	4	2	2	1	2	4	3	1	4	5	5	1	3	5	6	1	2	4	5	4	3
TOTAL SPECIES	92	112	94	100	87	88	90	101	136	94	103	111	110	98	93	75	123	98	83	122	95	134	108	102

Table 9 Listing of the dominant benthic taxa ranked by number of species.

LAKE	DOMINANT TAXA BY SPECIES	TOTAL SPECIES SPRING	DOMINANT TAXA BY SPECIES	TOTAL SPECIES FALL
BLUE CHALK	DIPTERA	45	DIPTERA	61
	TRICHOPTERA	11	TRICHOPTERA	12
	EPHEMEROPTERA	7	ODONATA	9
CLEAR	DIPTERA	50	DIPTERA	51
	TRICHOPTERA	10	TRICHOPTERA	13
	ODONATA	6	ODONATA	10
CRADLE	DIPTERA	45	DIPTERA	44
	TRICOPTERA	12	TRICOPTERA	15
	ODONATA	5	ODONATA	9
CROSSON	DIPTERA	46	DIPTERA	43
	TRICHOPTERA	9	TRICHOPTERA	14
	ODONATA	8	ODONATA	14
DELANO	DIPTERA	61	DIPTERA	45
	TRICHOPTERA	17	TRICHOPTERA	13
	ODONATA	12	ODONATA	13
HAMER	DIPTERA	52	DIPTERA	50
	TRICHOPTERA	13	ODONATA	16
	ODONATA	11	TRICHOPTERA	13
HARP	DIPTERA	49	DIPTERA	42
	TRICHOPTERA	14	TRICHOPTERA	12
	OLIGOCHAETA	7	ODONATA	10
PINCHER	DIPTERA	51	DIPTERA	37
	TRICHOPTERA	14	TRICHOPTERA	10
	ODONATA	6	ODONATA	6
PLASTIC	DIPTERA	72	DIPTERA	46
	TRICHOPTERA	12	TRICHOPTERA	14
	ODONATA	7	ODONATA	13
SKIDWAY	DIPTERA	44	DIPTERA	58
	ODONATA	11	TRICHOPTERA	20
	TRICHOPTERA	9	ODONATA	15
WESTWARD	DIPTERA	50	DIPTERA	82
	EPHEMEROPTERA	7	TRICHOPTERA	11
	TRICHOPTERA	6	OLIGOCHAETA	6
YOUNG	DIPTERA	57	DIPTERA	43
	TRICHOPTERA	14	TRICHOPTERA	12
	EPHEMEROPTERA	7	EPHEMEROPTERA	8

Table 10 Listing of the dominant benthic taxa ranked by number of individuals.

LAKE	DOMINANT TAXA BY COUNT	COUNTS SPRING	DOMINANT TAXA BY COUNT	COUNTS FALL
BLUE CHALK	DIPTERA	704	AMPHIPODA	1341
	AMPHIPODA	596	DIPTERA	1305
	EPHEMEROPTERA	150	EPHEMEROPTERA	598
CLEAR	DIPTERA	1032	AMPHIPODA	1056
	AMPHIPODA	530	DIPTERA	872
	EPHEMEROPTERA	186	EPHEMEROPTERA	541
CRADLE	DIPTERA	1362	DIPTERA	1646
	EPHEMEROPTERA	479	AMPHIPODA	1055
	AMPHIPODA	376	EPHEMEROPTERA	355
CROSSON	EPHEMEROPTERA	410	AMPHIPODA	1811
	DIPTERA	227	DIPTERA	1627
	AMPHIPODA	97	EPHEMEROPTERA	805
DELANO	DIPTERA	1476	EPHEMEROPTERA	768
	EPHEMEROPTERA	580	AMPHIPODA	683
	AMPHIPODA	430	DIPTERA	499
HAMER	DIPTERA	1015	AMPHIPODA	3617
	EPHEMEROPTERA	714	EPHEMEROPTERA	1672
	AMPHIPODA	159	DIPTERA	1521
HARP	DIPTERA	1039	AMPHIPODA	2095
	AMPHIPODA	360	DIPTERA	1044
	EPHEMEROPTERA	242	ODONATA	346
PINCHER	DIPTERA	1965	DIPTERA	1652
	EPHEMEROPTERA	549	EPHEMEROPTERA	451
	AMPHIPODA	307	AMPHIPODA	448
PLASTIC	DIPTERA	666	DIPTERA	2225
	AMPHIPODA	99	AMPHIPODA	343
	EPHEMEROPTERA	89	EPHEMEROPTERA	263
SKIDWAY	DIPTERA	1113	DIPTERA	6040
	EPHEMEROPTERA	428	EPHEMEROPTERA	1582
	AMPHIPODA	205	TRICOPTERA	496
WESTWARD	AMPHIPODA	605	AMPHIPODA	1312
	DIPTERA	505	DIPTERA	1163
	EPHEMEROPTERA	481	EPHEMEROPTERA	417
YOUNG	DIPTERA	657	AMPHIPODA	1980
	AMPHIPODA	439	DIPTERA	649
	EPHEMEROPTERA	230	PELECYPODA	231

Table 11 The diversity-evenness fall data for the 12 lakes with the corresponding pair-wise matrix of between lake comparisons using H´. Values above the diagonal are t-values and their associated probabilities are below the diagonal.

	Diversity (H')	Evenness (J')	LAKE CODE											
LAKE NAME			BC	CN	CL	CR	DO	HP	HR	PC	PN	SY	WD	YG
BLUE CHALK	1.161	0.591	–	1.911	4.216	3.317	3.299	2.781	2.908	3.923	3.938	3.602	3.207	2.957
CROSSON	1.101	0.563	<0.100	–	4.672	3.877	3.827	3.389	3.566	4.495	4.525	4.221	3.846	3.604
CLEAR	1.468	0.753	<0.001	<0.001	–	2.693	2.521	3.121	3.308	2.302	2.384	2.842	3.135	3.249
CRADLE	1.344	0.704	<0.001	<0.001	<0.010	–	0.720	1.691	1.832	1.729	1.672	0.503	1.388	1.730
DELANO	1.353	0.726	<0.010	<0.001	<0.050	<0.500	–	1.790	1.919	1.479	1.409	0.598	1.536	1.829
HARP	1.295	0.691	<0.010	<0.001	<0.010	<0.100	<0.100	–	0.391	2.458	2.435	1.875	1.147	0.417
HAMER	1.292	0.691	<0.010	<0.001	<0.010	<0.100	<0.100	>0.500	–	2.676	2.663	2.068	1.301	0.608
PLASTIC	1.388	0.745	<0.001	<0.001	<0.050	<0.100	<0.200	<0.050	<0.010	–	0.570	1.832	2.387	2.590
PINCHER	1.384	0.745	<0.001	<0.001	<0.050	<0.100	<0.200	<0.050	<0.010	>0.500	–	1.775	2.363	2.573
SKIDWAY	1.348	0.721	<0.001	<0.001	<0.010	>0.500	>0.500	<0.100	<0.050	<0.100	<0.100	–	1.620	1.958
WESTWARD	1.316	0.686	<0.010	<0.001	<0.010	<0.200	<0.200	<0.200	<0.200	<0.050	<0.050	<0.200	–	1.137
YOUNG	1.298	0.671	<0.010	<0.001	<0.010	<0.100	<0.100	>0.500	>0.500	<0.050	<0.050	<0.100	<0.500	–

For a single comparison t=1.972 @ P=0.05; given 66 possible multiple comparisons the Bonferroni adjusted t value to maintain an overall probability of 0.05 is: t>3.340

Table 12 A comparison of the Shannon-Wiener diversities for the spring and fall genera from the 12 lakes. Horizontal lines denote groups of lakes with statistically similar H´ values.

SPRING 88

Blue Chalk	Plastic	Crosson	Clear	Young	Westward	Cradle	Hamer	Harp	Pincher	Skidway	Delano
1.07	1.378	1.398	1.528	1.534	1.563	1.606	1.619	1.655	1.664	1.677	1.682

FALL 88

Crosson	Blue Chalk	Hamer	Harp	Young	Westward	Cradle	Skidway	Delano	Pincher	Plastic	Clear
1.101	1.161	1.292	1.295	1.298	1.316	1.344	1.348	1.353	1.384	1.388	1.468

Table 13 Listing of the species found only in one lake, in the spring and fall surveys.

SPRING				FALL			
MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE	MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE
	TURBELLARIA				**TURBELLARIA**		
204	Divispiculimermis sp.	CLEAR	1				
206	Hydromermis sp.	HARP	1				
	OLIGOCHAETA				**OLIGOCHAETA**		
302	Arteonais lomondi	HARP	1				
306	Limnodrilus claparedianus	PLASTIC	1				
				317	Nais simplex	HAMER	1
320	Stylodrilus heringianus	YOUNG	1				
322	Tasserkidrilus harmani	DELANO	1				
328	Vejdovskyella comata	DELANO	1				
	HIRUDINEA				**HIRUDINEA**		
				405	Glossiphonia complanata	YOUNG	1
406	Haemopis marmorata	WESTWARD	1				
				414	Placobdella multilineata	PLASTIC	1
				416	Placobdella ornata	WESTWARD	1
				418	Desserobdella picta	HAMER	1
	ISOPODA				**ISOPODA**		
502	Asellus forbesi	SKIDWAY	37	502	Asellus forbesi	SKIDWAY	115
	AMPHIPODA				**AMPHIPODA**		
602	Crangonyx gracilis	PLASTIC	57	602	Crangonyx gracilis	BLUE CHALK	3
	DECAPODA				**DECAPODA**		
				701	Cambarus bartoni	CRADLE	2
	HYDRACARINA				**HYDRACARINA**		
				802	Arrenurus (s.str.) americanus	PLASTIC	1
804	Arrenurus (s.str.) auricularis	HAMER	1				
806	Arrenurus (Mega.) apetiolatus	HAMER	1	806	Arrenurus (Mega.) apetiolatus	HAMER	6
808	Arrenurus (Mega.) cardiacus	DELANO	1				
				810	Arrenurus (Mega.) megalurus	HAMER	1
812	Atractides undescr. sp.	DELANO	1				
816	Hydrodroma americanus	HARP	1	816	Hydrodroma americanus	HAMER	6
820	Hygrobates neocalliger	HARP	1				
822	Lebertia distincta	DELANO	1				
				828	Pseudohydryphantes orbicularis	HAMER	2
				830	Unionicola crassipes laurentiana	HAMER	25
832	Arrenurus (Mega.) bergei	WESTWARD	1				
				834	Arrenurus (Mega.) elevatus	YOUNG	1
	COLLEMBOLA				**COLLEMBOLA**		
902	Folsomia sp.	WESTWARD	1				
908	Metisotoma sp.	PLASTIC	1				
	EPHEMEROPTERA				**EPHEMEROPTERA**		
				1007	Cleon rubropictum	YOUNG	1
1008	Ephemera simulans	BLUE CHALK	4				
				1024	Siphloplecton basale	HARP	1

Table 13 Continued ...

SPRING				FALL			
MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE	MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE
	ODONATA				ODONATA		
				1105	Argia violacea	HAMER	9
1108	Boyeria grafiana	CROSSON	2				
				1110	Chromagrion conditum	PLASTIC	4
1112	Cordulegaster sp.	PINCHER	1				
1116	Didymops transversa	BLUE CHALK	2				
1124	Enallagma vesperum	SKIDWAY	7	1124	Enallagma vesperum	SKIDWAY	35
1136	Leucorrhinia frigida	HAMER	19				
	PLECOPTERA				PLECOPTERA		
				1202	Nemoura trispinosa	YOUNO	1
				1204	Soyedina sp.	WESTWARD	2
	HEMIPTERA				HEMIPTERA		
				1301	Buenoa macrotibialis	PINCHER	1
1304	Corixidae juv.	BLUE CHALK	1				
				1308	Hesperocorixa kennicotti	SKIDWAY	13
1310	Hesperocorixa lobata	HARP	1				
				1312	Hesperocorixa michiganensis	SKIDWAY	8
1314	Hesperocorixa vulgaris	HAMER	1				
				1316	Notonecta (Paranecta) insulata	PINCHER	3
1322	Sigara (Arcto.) penniensis	CRADLE	2	1322	Sigara (Arcto.) penniensis	CRADLE	3
1326	Sigara (Phaeo.) mackinacensis	CRADLE	2	1326	Sigara (Phaeo.) mackinacensis	WESTWARD	2
				1328	Sigara (Phaeo.) macropala	PINCHER	2
1330	Sigara (Pileo.) douglasensis	HAMER	1	1330	Sigara (Pileo.) douglasensis	HARP	1
1332	Sigara (Vermi.) deflecta	CRADLE	4				
	NEUROPTERA				NEUROPTERA		
1502	Climacia areolaris	CRADLE	1				
	TRICHOPTERA				TRICOPTERA		
				1603	Agrypnia improba	SKIDWAY	1
1610	Ceraclea alces	DELANO	1				
				1636	Oecetis sp.4	SKIDWAY	2
				1638	Orthotrichia	SKIDWAY	1
				1639	Oecetis sp.6	DELANO	1
1644	Oxyethira sp.3	DELANO	9				
				1645	Phryganea sp.	SKIDWAY	1
	LEPIDOPTERA				LEPIDOPTERA		
1702	Acentria sp.1	WESTWARD	1	1702	Acentria sp.1	SKIDWAY	4
1704	Crambus sp.1	HARP	1				

Table 13 Continued ...

SPRING				FALL			
MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE	MOE IDCODE	SPECIES		
	COLEOPTERA				**COLEOPTERA**		
1802	Agabus sp.	PLASTIC	2				
				1804	Dineutus horni	SKIDWAY	2
				1816	Gyrinus frosti	DELANO	1
1818	Gyrinus latilimbus	DELANO	1				
1820	Gyrinus sayi (=lugens)	CLEAR	1				
1824	Gyrinus ventralis?	PINCHER	1	1824	Gyrinus ventralis?	SKIDWAY	1
				1828	Haliplus pantherinus	YOUNG	1
1834	Macronychus glabratus	HARP	1				
1836	Melyridae	DELANO	1				
1842	Scirtes sp.2	CRADLE	2				
1844	Scirtes sp.3	HAMER	1				
				1850	Coptotomus longulus	PINCHER	1
				1854	Tropisternus mixtus	SKIDWAY	2
				1856	Terrestrial forms	SKIDWAY	6
DIPTERA:CERATOPOGONIDAE				**DIPTERA: CERATOPOGONIDAE**			
2101	Alluaudomyia sp.	DELANO	11				
2102	Atrichopogon polydactylus	HAMER	1				
2118	Bezzia sp.7	CLEAR	1				
				2120	Culicoides (O.) stellifer	WESTWARD	4
2122	Culicoides sp.1	HAMER	2				
2124	Culicoides sp.2	CROSSON	1				
2126	Porcipomyia sp.	PLASTIC	1	2126	Porcipomyia sp.	WESTWARD	1
2140	Isohelea sp.	PLASTIC	2				
				2142	Palpomyia sp.1 tibialis gr.	CRADLE	1
2152	Probezzia sp.4	SKIDWAY	1				
DIPTERA:Sub-family-Tanypodinae				**DIPTERA: Sub-family-Tanipodinae**			
2414	Guttipelopia guttipennis	SKIDWAY	14	2414	Guttipelopia guttipennis	SKIDWAY	29
2418	Labrundinia neopilosella	DELANO	8				
2430	Trissopelopia ogemawi	HARP	2				
2432	Zavrelimyia sp.1	BLUE CHALK	1	2432	Zavrelimyia sp.1	BLUE CHALK	26
DIPTERA: Sub-family-Diamesinae				**DIPTERA: Sub-family-Diamesinae**			
				2501	Potthastia sp.1 longimana gr.	YOUNG	3

Table 13 Continued ...

SPRING				FALL			
MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE	MOE IDCODE	SPECIES		
DIPTERA:Sub-family-Orthocladinae				**DIPTERA: Sub-family-Orthocladinae**			
2702	Acricotopus sp.	PLASTIC	1				
2704	Brillia parva	YOUNG	1	2704	Brillia parva	SKIDWAY	2
2710	Corynoneura lobata	SKIDWAY	1				
2718	Cricotopus (s.str.) nr. albiforceps	PLASTIC	1				
				2719	Cricotopus (s.str.) sp. bicinctus gr.	SKIDWAY	4
2720	Cricotopus (s.str.) sp. cylindraceus grr	CROSSON	1				
				2732	Cricotopus (Iso.) sp.1 sylvestris gr.	DELANO	1
2734	Diplocladius sp.	YOUNG	1				
2736	Doithrix sp.1	PLASTIC	1				
2738	Doithrix sp.2	HARP	1				
				2739	Epoicocladius flavens	YOUNG	1
2748	Hydrobaenus fusistylus	HARP	1				
2752	Nanocladius (s.str.) nr. minimus	CROSSON	1	2752	Nanocladius (s.str.) nr. minimus	HAMER	2
2754	Nanocladius (s.str.) sp.	HARP	1				
				2758	Parakiefferiella sp.1 (ELA)	CRADLE	1
2768	Platysmittia? sp.	YOUNG	1				
				2772	Psectrocladius (Mono.) cf. calcarat	CLEAR	1
				2777	Psectrocladius (s.str.) sordidellus	SKIDWAY	117
				2778	Pseudorthocladius sp.	SKIDWAY	3
2782	Pseudosmittia sp.1	HARP	2				
2786	Smittia sp.	PLASTIC	1				
2792	Thienemanniella sp.A (ELA)	PLASTIC	3				
DIPTERA:Sub-family-Chironominae				**DIPTERA:Sub-family-Chironominae**			
	Tribe- Chironomini				**Tribe-Chironomini**		
2904	Chironomus (Campto.) ?tentans	PLASTIC	6	2904	Chironomus (Campto.) ?tentans	PINCHER	3
2910	Cryptochironomus spp.	HAMER	1				
				2917	Dicrotendipes nervosus	WESTWARD	1
2932	Nilothauma sp.	DELANO	3	2932	Nilothauma sp.	SKIDWAY	90
2944	Paracladopelma undine	YOUNG	2				
2946	Paracladopelma sp.1	BLUE CHALK	1				
2948	Paralauterborniella nigrohalterale	YOUNG	1				
2968	Polypedilum (s.lat.) sp.4	YOUNG	1				
				2990	Polypedilum (s.str.) fallax gr.	SKIDWAY	1
				2992	Polypedilum (s.str.) trigonum	SKIDWAY	3
				2993	Polypedilum (s.lat.) sp.2A	BLUE CHALK	1
				2994	Polypedilum (s.lat.) sp.5	SKIDWAY	11
				2997	Xenochironomus xenolabis	DELANO	1
DIPTERA:Tabanidae					**DIPTERA:Tabanidae**		
3102	Chrysops ater	DELANO	1				
				3104	Chrysops undesc. sp.	HAMER	1
3106	Chrysops sp(p).	SKIDWAY	1	3109	Tabanus marginalis	SKIDWAY	1
DIPTERA:Tipulidae					**DIPTERA: Tipulidae**		
3202	Dactylolabis sp.	HAMER	5				
				3204	Hexatoma sp.	PLASTIC	1
3210	Ormosia sp.(1)	HARP	1				
				3211	Pedicia sp.	SKIDWAY	3
				3220	Gonomyia sp.	PLASTIC	2

Table 13 Continued ...

SPRING				FALL			
MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE	MOE IDCODE	SPECIES		
DIPTERA:Miscellaneous					**DIPTERA: Miscellaneous**		
3306	Dixidae:Dixella sp.	YOUNG	1				
3308	Dolichopodidae	PLASTIC	6				
				3310	Empididae:Hemerodromia sp.	WESTWARD	5
				3311	Empididae: other genera	WESTWARD	1
3312	Phoridae	PINCHER	1				
3314	Platypezidae:Platypeza sp.1	PLASTIC	1				
3318	Ptychopteridae:Battacomorpha sp.	YOUNG	2				
GASTROPODA					**GASTROPODA**		
				3503	Campeloma decisum	YOUNG	4
3506	Physella (s.str.) gyrina	YOUNG	4	3506	Physella (s.str.) gyrina	YOUNG	3
PELECYPODA					**PELECYPODA**		
				3616	Musculim securis	HARP	17

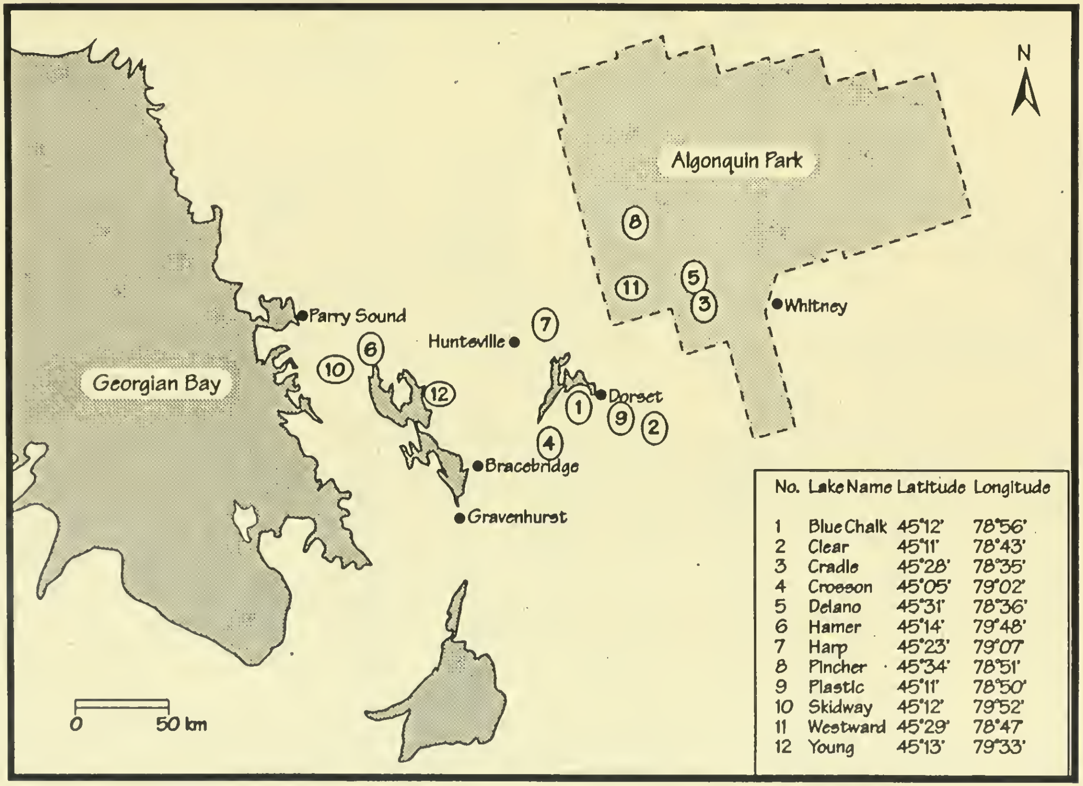
Table 14 Listing of the species common to all 12 lakes, in the spring and fall surveys.

SPRING		FALL	
MOE IDCODE	SPECIES	MOE IDCODE	SPECIES
300	OLIGOCHAETA	300	OLIGOCHAETA
		304	Enchytraeidae
312	Lumbriculus variegatus	312	Lumbriculus variegatus
600	AMPHIPODA	600	AMPHIPODA
604	Crangonyx laurentianus		
606	Hyalella azteca	606	Hyalella azteca
1000	EPHEMEROPTERA	1000	EPHEMEROPTERA
1012	Eurylophella temporalis	1012	Eurylophella temporalis
1032	Leptophlebia intermedia	1032	Leptophlebia intermedia
		1100	ODONATA
		1128	Gomphus exilis
		1600	TRICOPTERA
		1658	Pycnopsyche sp(p)
2100	DIPTERA: CERATOPOGONIDAE		DIPTERA: CERATOPOGONIDAE
2400	Subfam. Tanypodinae	2400	Subfam. Tanypodinae
2402	Ablabesmyia (s. str.) spp.	2402	Ablabesmyia (s. str.) spp.
2410	Conchapelopia sp.	2410	Conchapelopia sp.
2426	Procladius (s.lat) spp.	2426	Procladius (s.lat) spp.
2700	Subfam. Orthocladiinae	2700	Subfam. Orthocladiinae
2774	Psectrocladius (s.str.) litofilus	2774	Psectrocladius (s.str.) litofilus
2900	Tribe–Chironomini	2900	Tribe–Chironomini
2908	Cryptochironomus conus	2908	Cryptochironomus conus
		2916	Dicrotendipes modestus
		2918	Dicrotendipes tritomus
		2928	Microtendipes pedellus
		2980	Stenochironomus hilaris
2986	Tribelos jucundum	2986	Tribelos jucundum
3000	Tribe–Tanytarsini	3000	Tribe–Tanytarsini
		3002	Cladotanytarsus sp.
3016	Tanytarsus/Micropsectra spp.	3016	Tanytarsus/Micropsectra spp.
3600	PELECYPODA	3600	PELECYPODA
3602	Pisidium casertanum	3602	Pisidium casertanum

Table 15. Spearman rank correlations between each of the 12 lakes based on the spatial (above the diagonal) and the temporal (below diagonal) variance components for the 24 major taxonomic groups (P=0.05 @ r=0.425, P=0.01 @ r=0.544, P=0.001 @ r=0.667).

Lake	Lake code											
code	BC	CL	CN	CR	DO	HP	HR	PC	PN	SY	WD	YG
BC	-	0.370	0.019	0.331	-0.011	-0.137	-0.609	0.208	-0.266	0.353	-0.212	-0.116
CL	0.209	-	0.557	0.014	0.159	-0.278	-0.357	0.282	-0.172	0.540	-0.374	-0.391
CN	0.127	0.087	-	-0.248	0.019	-0.113	0.045	0.323	-0.109	0.418	-0.006	-0.311
CR	0.085	-0.174	-0.290	-	-0.175	0.183	-0.366	0.300	-0.001	0.305	0.183	-0.034
DO	0.228	-0.048	0.272	-0.172	-	-0.206	0.023	0.303	0.134	-0.035	-0.103	0.001
HP	-0.210	0.518	-0.139	-0.042	-0.400	-	0.546	-0.240	0.353	-0.139	-0.010	0.214
HR	-0.014	-0.093	0.118	-0.037	-0.364	0.307	-	-0.392	0.418	-0.251	-0.031	0.263
PC	0.571	0.031	0.638	-0.250	0.457	-0.431	0.004	-	0.110	0.513	0.039	-0.335
PN	0.032	-0.155	0.368	0.150	0.391	-0.124	0.178	0.179	-	0.035	-0.032	0.223
SY	0.564	-0.108	0.506	-0.096	0.324	-0.405	-0.115	0.766	0.240	-	-0.255	-0.083
WD	0.198	-0.383	0.366	-0.029	0.396	-0.502	0.103	0.447	0.211	0.387	-	0.190
YG	0.117	0.358	0.031	0.280	-0.035	-0.029	0.052	-0.071	-0.057	-0.232	-0.165	-

Figure 1 Map illustrating the location of the study lakes in south central Ontario.



No.	Lake Name	Latitude	Longitude
1	Blue Chalk	45°12'	78°56'
2	Clear	45°11'	78°43'
3	Cradle	45°28'	78°35'
4	Crosson	45°05'	79°02'
5	Delano	45°31'	78°36'
6	Hamer	45°14'	79°48'
7	Harp	45°23'	79°07'
8	Pincher	45°34'	78°51'
9	Plastic	45°11'	78°50'
10	Skidway	45°12'	79°52'
11	Westward	45°29'	78°47'
12	Young	45°13'	79°33'

Figure 2 Littoral zone - mid-lake chemistry comparison for nitrate, ammonium, total Kjeldahl nitrogen and total phosphorus.

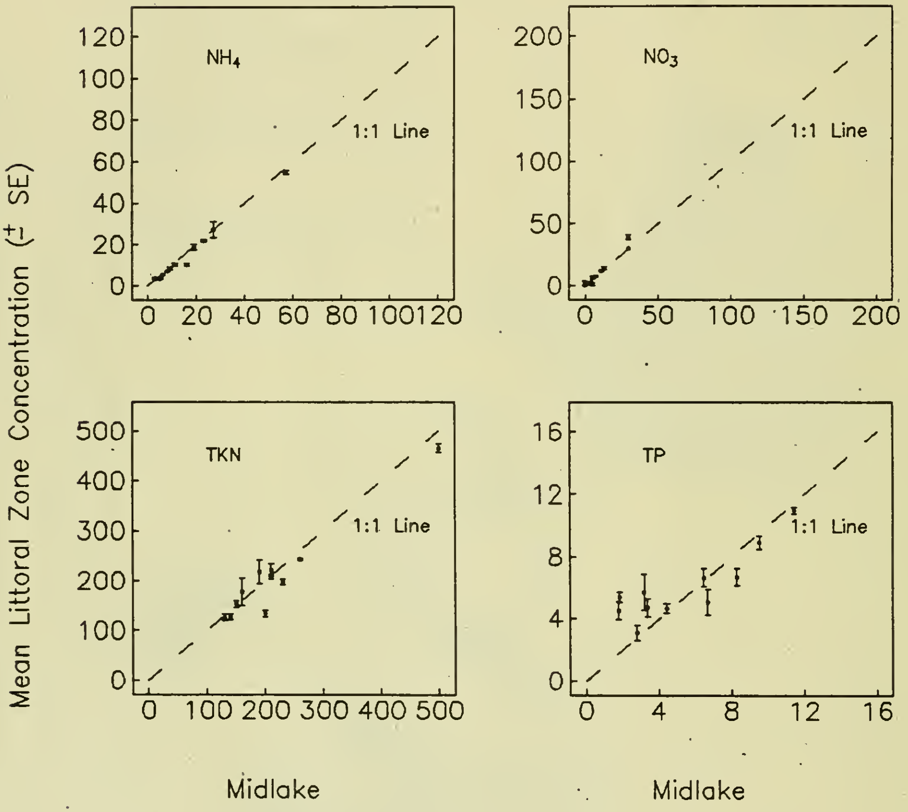


Figure 3 Z-score plot of the species richness and abundance data from the spring and fall surveys of the 12 lakes.

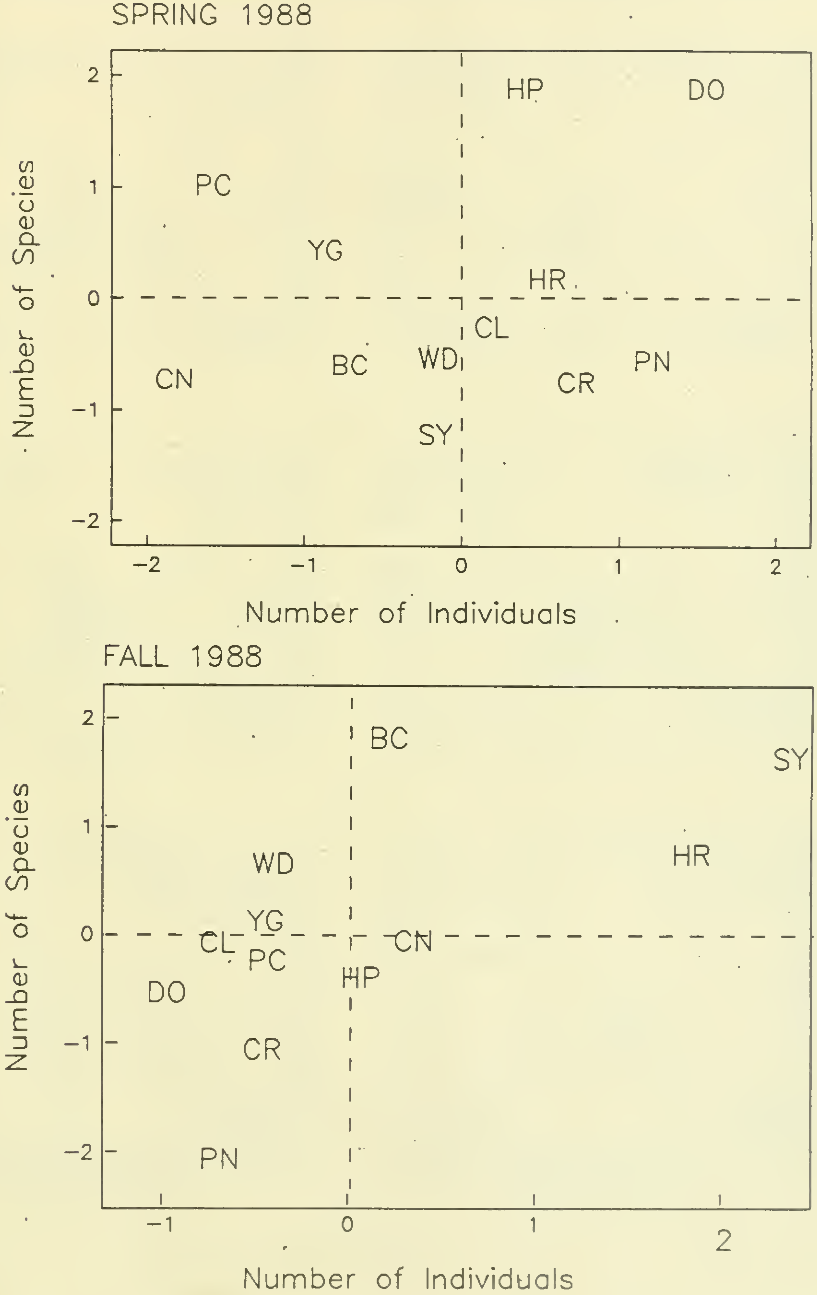


Figure 4 Spatial and temporal variance component plots for the major taxonomic groups. Two-letter codes refer to the lake names.

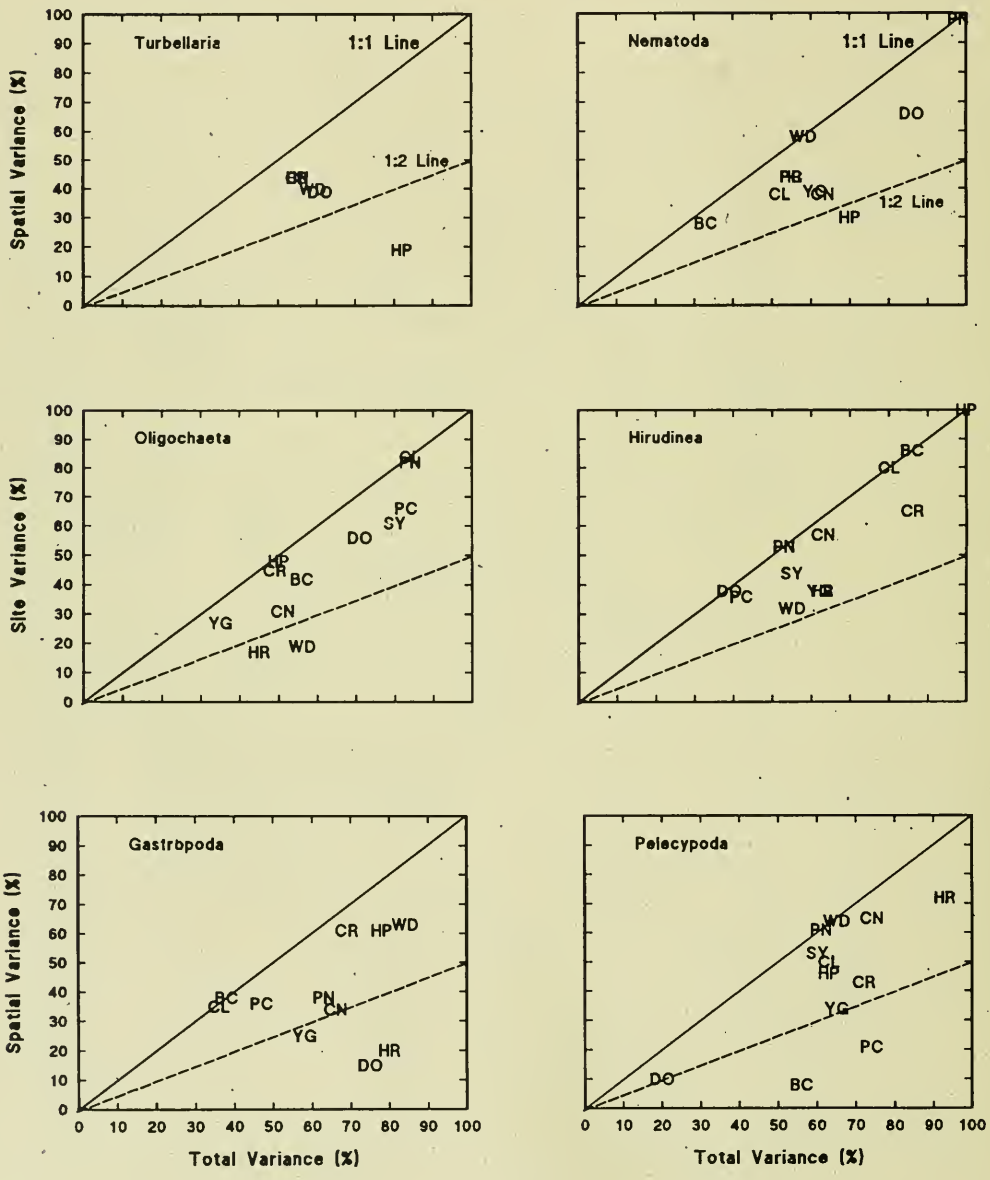


Figure 4 Continued ...

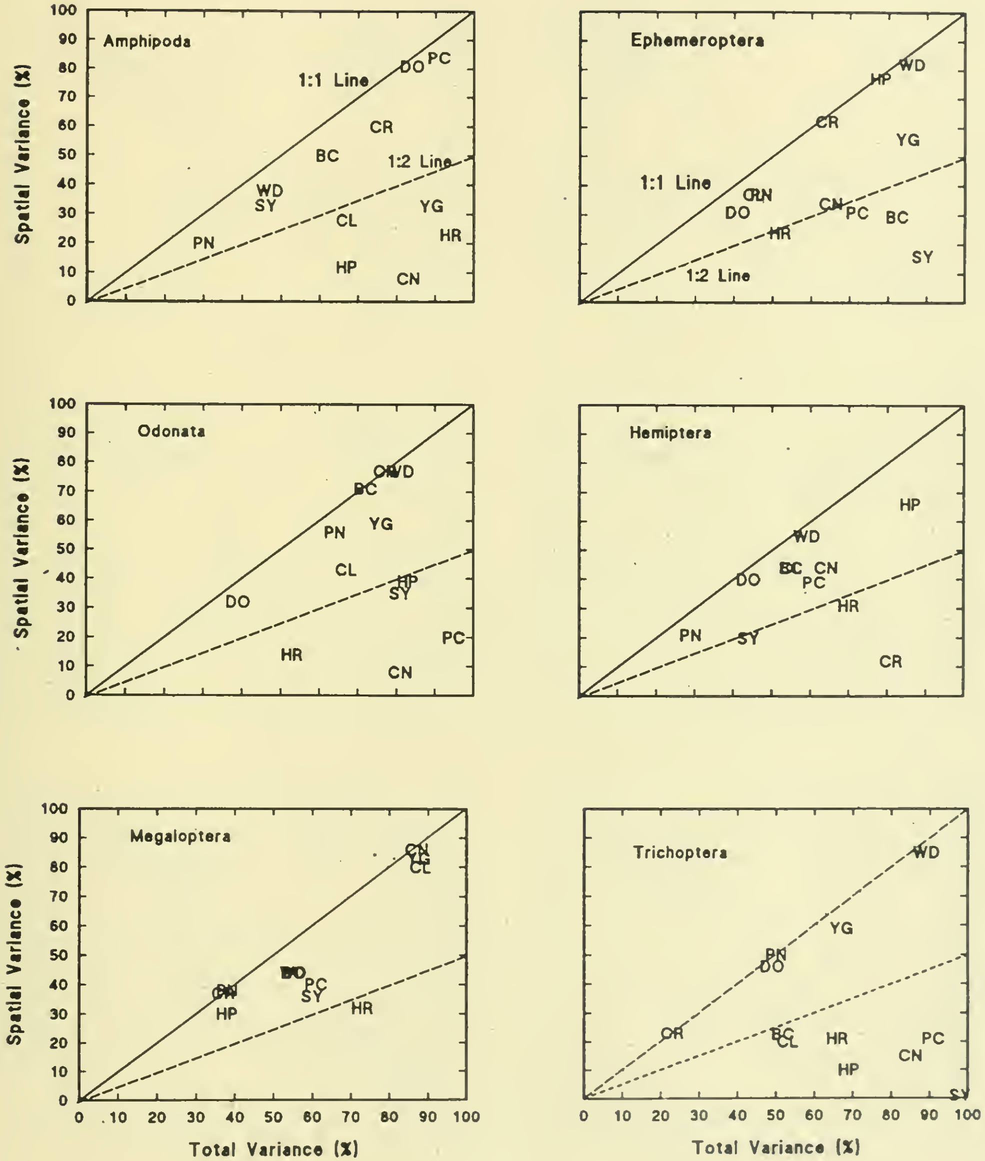


Figure 4 Continued ...

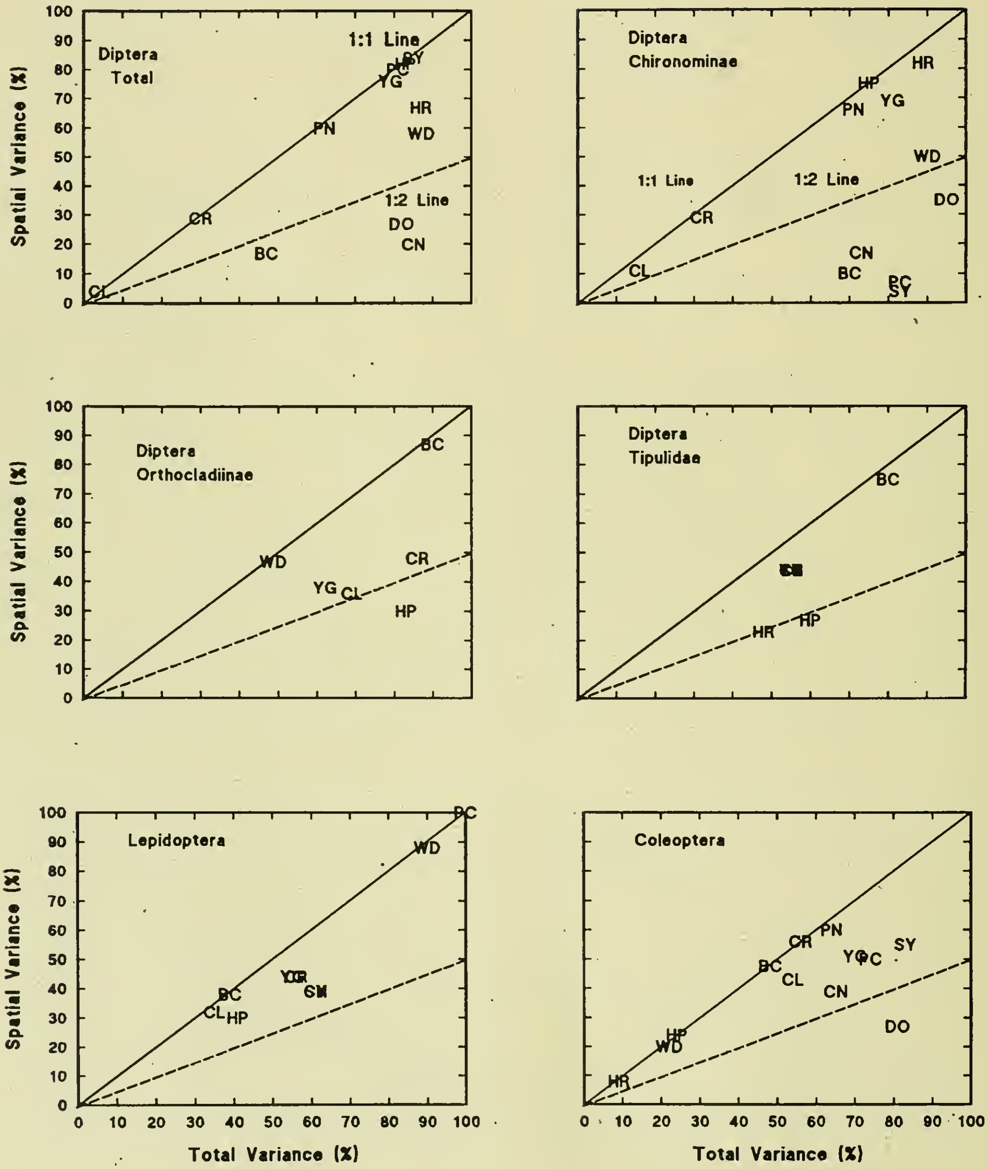


Figure 4 Continued ...

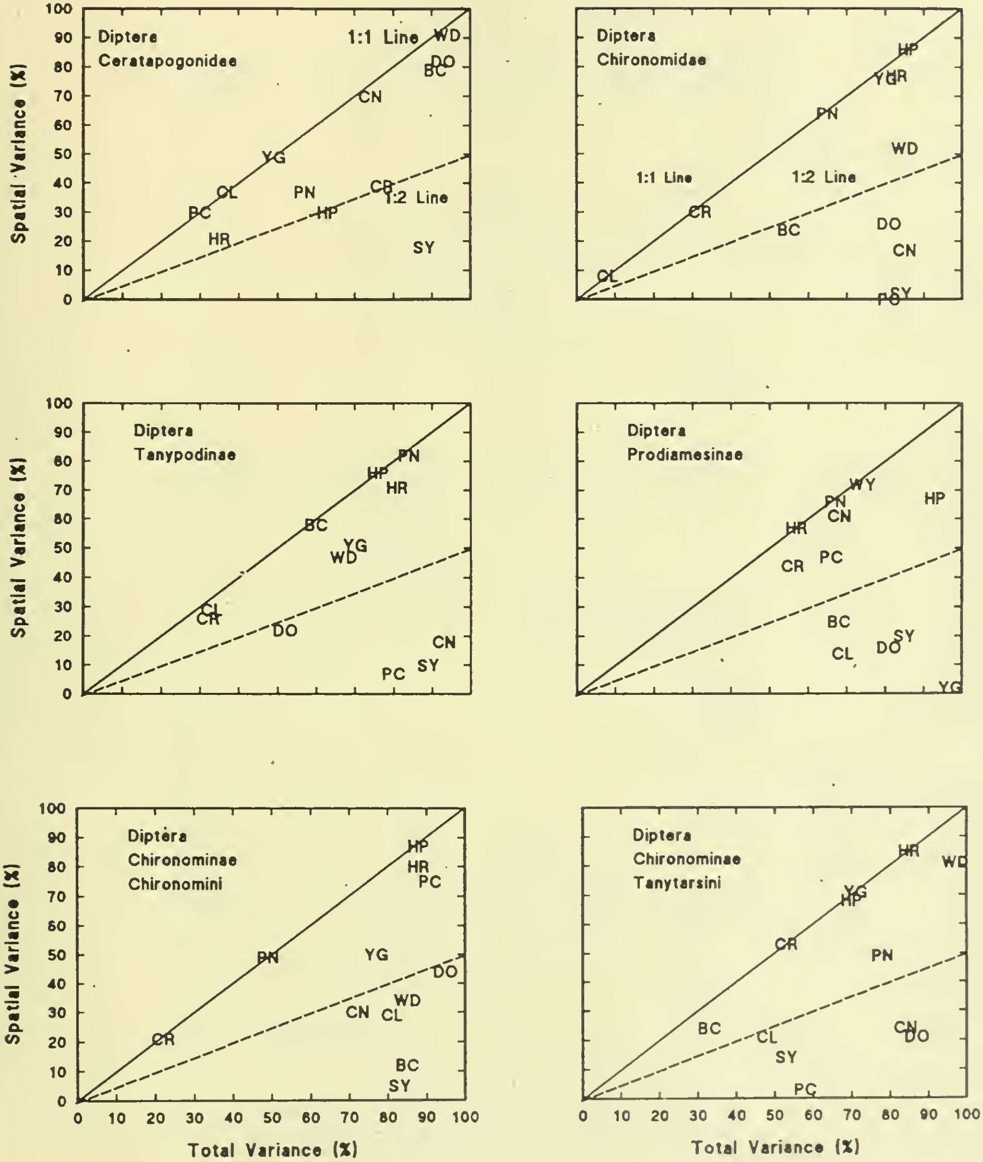
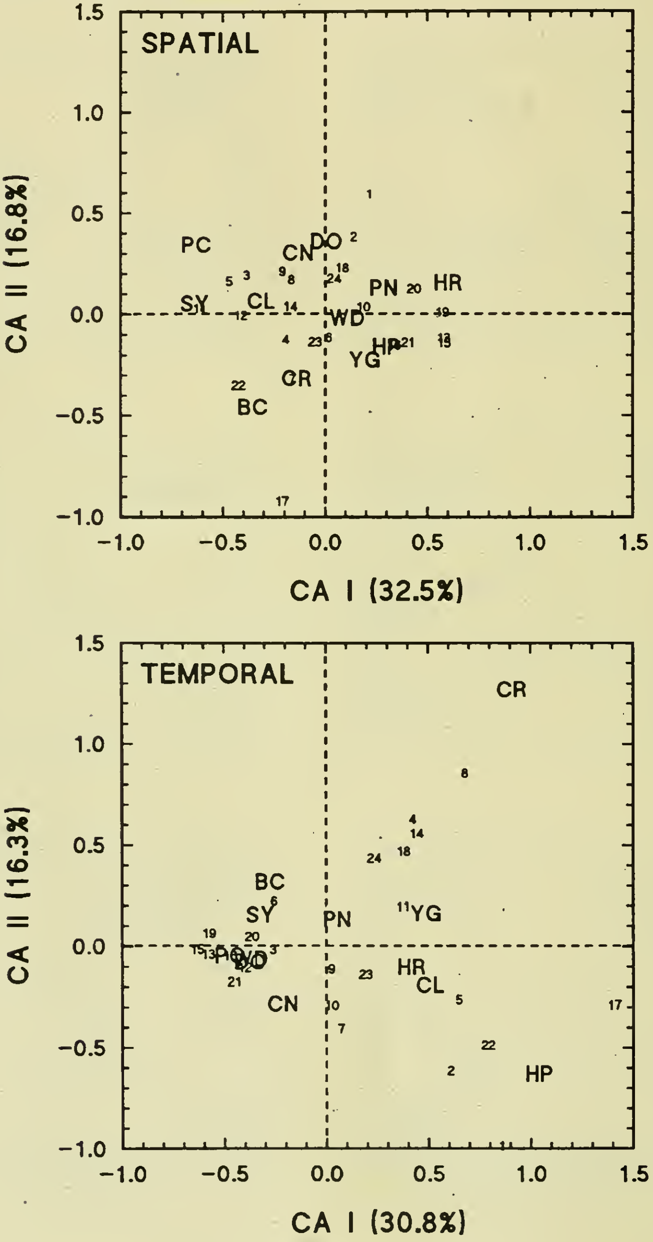


Figure 5 Correspondence analysis biplots of the 12 lakes and 24 major taxonomic groups for the spatial and temporal variance components.



APPENDIX 1

LRTAP RATIONALE AND SAMPLING PROTOCOLS FROM BENTHIC BIOMONITORING WORKING GROUP

As part of the overall biological effects monitoring program, the periodic survey of lake benthos is intended to give a reliable estimate of community structure for the common, but sensitive, benthic and semi-benthic macroinvertebrates and to determine the response through time of these communities to changing environmental conditions. The emphasis has been placed on sampling three major groups: Ephemeroptera, Trichoptera and Crustacea, partly due to the established sensitivity of these groups to a variety of contaminants and partly because these groups are important links in the food chain, are widely represented across the country and easily sampled by a variety of techniques.

Four principal sampling activities are used to characterize the benthic fauna of each lake. First, representative segments of shoreline and the adjacent shallow littoral areas are sampled with sweep nets and by hand to collect Ephemeroptera, Trichoptera, Odonata, Amphipoda, Gastropoda and other miscellaneous shallow water forms. Second, dredge samples are taken from the deeper portions of the lake to collect Amphipoda, Mollusca and Insecta from the sub-littoral. Third, baited wire traps, set out overnight, are used to capture Decapoda and Hirudinea. And fourth, taxa such as *Mysis* or *Chaoborus*, which are benthic during the day, but planktonic at night, are captured by a series of night time, vertical net tows.

The methods presented here have been tested at the Experimental Lakes Area, northwestern Ontario and are thought to be generally applicable to most lacustrine habitats. Following an initial year of testing and evaluation, revisions or additions to the protocol may be necessary

Lake Selection

The "lake benthos" portion of the protocol is based on the assumption that lakes have been selected for their general usefulness in biomonitoring, according to the criteria agreed upon at the May, 1986 Winnipeg Workshop.

Survey Timing

It is difficult to base the characterization of any habitat on the presence or absence of the early life stages of most benthic invertebrates. Young are difficult to collect because they often choose refuges that are hard to sample effectively. Relative to the adult forms, young are small, fragile and often escape all but the finest mesh samplers, or are damaged beyond recognition. In addition, young are often morphologically different from the adults and generally of little use to the taxonomists. To ensure maximum benefit from the work, therefore, it is important that the benthic surveys be conducted at a time of year when the maximum number of species are present in the adult form or late larval stages.

For crustacean invertebrates, this time is in the spring or early summer. For the Trichoptera, Ephemeroptera and Odonata, adult insect emergence usually begins within a month or two after ice-out and continues throughout the summer, depending on the species present. While the taxonomy of insects is primarily based on the adults, the latter three groups are more easily sampled in their aquatic forms as larvae or nymphs and in most cases are taxonomically distinct enough to provide genus or species level identifications. Larval identifications of the Chironomidae or the Chaoboridae are more difficult without associates adult material. However, the period of chironomid emergence is protracted, due to the variety of species present in most habitats, so only a few adult forms could be sampled during a "one short" survey. Adult Diptera should, therefore, be overlooked and preference given to larval sampling. As with the other groups, the best time to do this is in the spring, prior to the major period of adult insect emergence. The resultant loss of taxonomic information for the chironomids and chaoborids is probably not critical since these insects generally appear to be more resistant to various forms of pollution than other benthic taxa.

Mollusks and leeches can be effectively sampled at any time of the year but, in the case of decapoda crustaceans, there are some advantages to sampling either in the spring or late fall. Crayfish overwinter in the intermoult stage and females lay eggs in the spring, so at this time of year, collections can be used to evaluate the maximum degree of exoskeleton hardening and breeding success. By late fall young-of-the-year crayfish can be captured (though sometimes with difficulty) to determine recruitment success.

Although the optimum time of year to sample each system will ultimately depend upon a consideration of the various life histories of its fauna, it seems that, as a general rule, it is best to sample in the spring.

Sampling Methods

a) Optimizing Sampling Effort

The sampling protocol outlined below is intended to be used as a guideline. The methodologies have been chosen for their general usefulness, but they are quite specific in their detail. Although it is recognized that they may not be universally applicable, each of the methods should be tried.

The lack of a precise definition of the amount of sampling effort required to yield a representative sample of the fauna in each habitat, is one area of critical weakness in the protocol. This is particularly true of the section on shoreline and shallow littoral sampling, where sampling effort has been defined as the amount of time spent performing each sampling activity. The shoreline and shallow water areas of most lakes are the most productive and diverse habitats and often the most difficult to sample effectively. This area also contains the greatest number of sensitive species, largely because the animals are exposed to the highest fluxes of pollutants entering the lake. It is important, therefore, to take great care when choosing the sampling sites and to obtain some measure of sampling efficiency.

Gear type, physical conditions of the area and the skill of individual workers are all factors which will affect collecting efficiency. Two procedures are recommended for the first year of sampling (and periodically thereafter) to maximize the specimen return and minimize sampling effort:

i) An experienced biologist should make the decisions about where to sample and how it should be done (assuming that modifications to standard procedures are necessary). The biologist should oversee the sampling operation, train assistants and eventually ensure program continuity from year to year.

ii) Using, as a guideline, the sampling times suggested in the "shore sampling" section of the protocol, the biologist should make three separate sets of collections at each site, then subsequently determine an optimum sampling strategy. This optimum should be taken as the sampling time necessary to obtain more than 90% of the maximum number of species found at any location. Similarly, the number of dredge and net tow samples required should also be evaluated.

b) Shore and Shallow Littoral Collections

i) Purpose

Many important indicator species occupy the shallow littoral habitat. Principally, one should expect to collect representatives of the Ephemeroptera, Trichoptera, Odonata, Decapoda, Amphipoda, Diptera and Coleoptera. The goal is to sample as many different areas as possible but, at the same time, avoid collecting large volumes of the vegetation, mud, allochthonous material, rocks and gravel that characterize this habitat. In addition, it is important to minimize habitat destruction during the sampling process.

ii) Site Selection and Documentation

Five shoreline sampling sites should be chosen for each lake. These locations should include both average and extreme habitat types, but should be chosen with a view to a representative characterization of the lake. Preference should be given to areas which afford good cover or great physical, within-site diversity. It is desirable that sites be chosen on both the windward and leeward shores. Areas within the immediate influence of inflowing rivers or streams should be avoided, unless there is some overriding reason to include them, because the faunal composition of these regions is more likely to reflect the characteristics of the inflow than those of the lake.

Site locations should be plotted on a lake map. Each site should then be described in writing and photographed to provide a record for future comparison. thus, any change in the species assemblage at a location can be correlated with long term changes in habitat condition. This baseline record is also useful for monitoring any habitat destruction which may occur as a result of the sampling activities.

Local conditions of wind speed and direction, air and water temperature, water level, cloud cover, precipitation, etc. should also be noted at the time of sampling.

iii) Sampling Procedures

Sweep net samples are to be taken from the complete range of habitat type in the 0-1 m depth range. With care, the amount of extraneous substrate collected by this method can be minimized. This is desirable because it not only simplifies the task of sorting out the specimens, but also reduces damage to the habitat. During the collecting period the net should be emptied frequently to prevent clogging and loss of specimens. **Suggested sampling time: 10 minutes.**

As the final phase of the shoreline sampling, the field worker should spend time making hand collections of invertebrates by turning over rocks, inspecting debris and examining other hard to sample habitats. This is often the most effective way of sampling Trichoptera, Ephemeroptera, Mollusca and other sessile or burrowing animals. Specimens (other than leeches) should be preserved as they are collected. Note that leeches contract when preserved, thereby obscuring their taxonomically useful features. To prevent this problem it is usually easiest to identify the material live or to narcotize specimens with carbon dioxide (Alka Seltzer tablets, dilute soft drinks, soda water or beer) prior to preserving them. **Suggested sampling time: 15 minutes.**

iv) Secondary Sample Processing and Specimen Identification

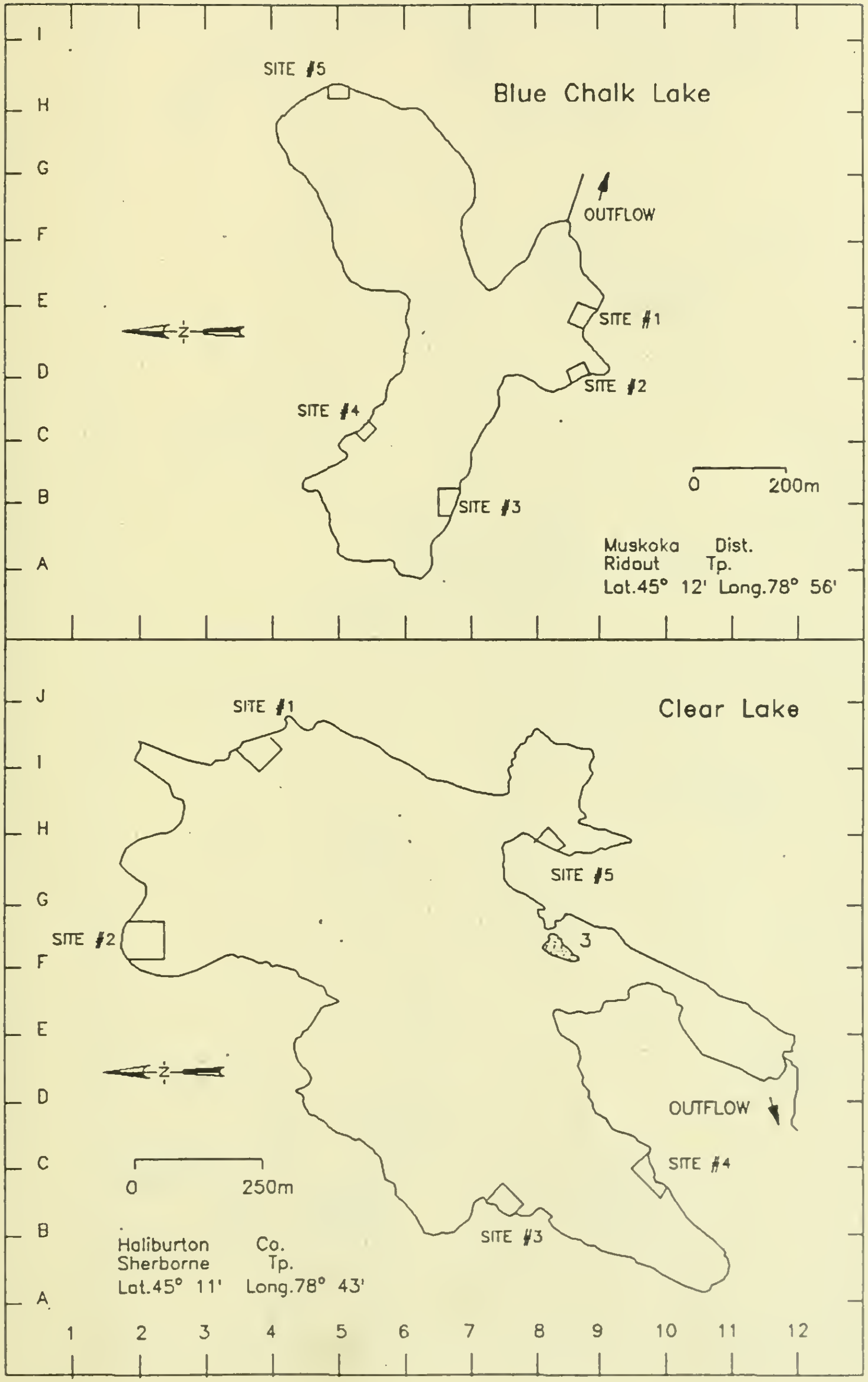
Once the specimens have been brought back to the laboratory they are fixed with Kahle's fluid for two days. The preservative should then be changed to 70% Ethanol to prevent specimens from becoming bleached or embrittled.

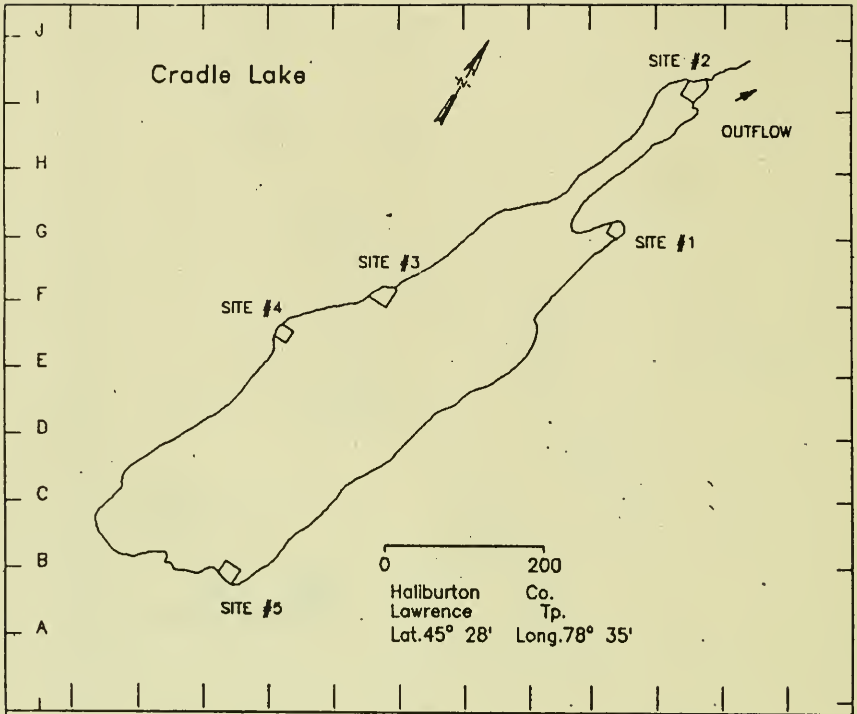
To facilitate sorting, unprocessed, preserved samples may be stained with Rose Bengal solution (a vital stain that colours animal tissues pink) just prior to examining them in the laboratory.

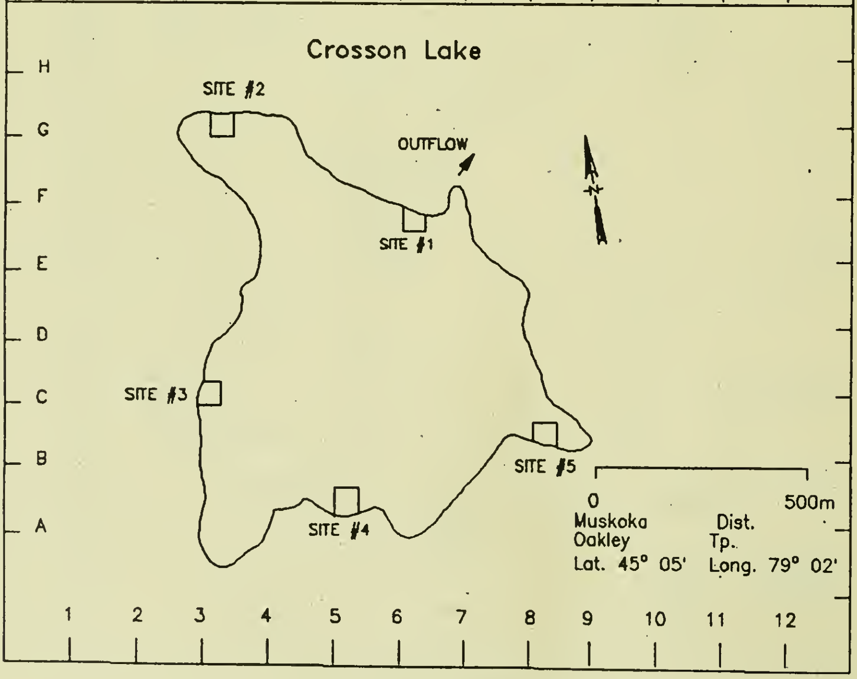
Specimens should be identified to the species level (where possible) according to the taxonomic keys given in the references listed in Appendix 2, or with the aid of taxonomic experts. Type specimens of all taxa should be archived for future reference.

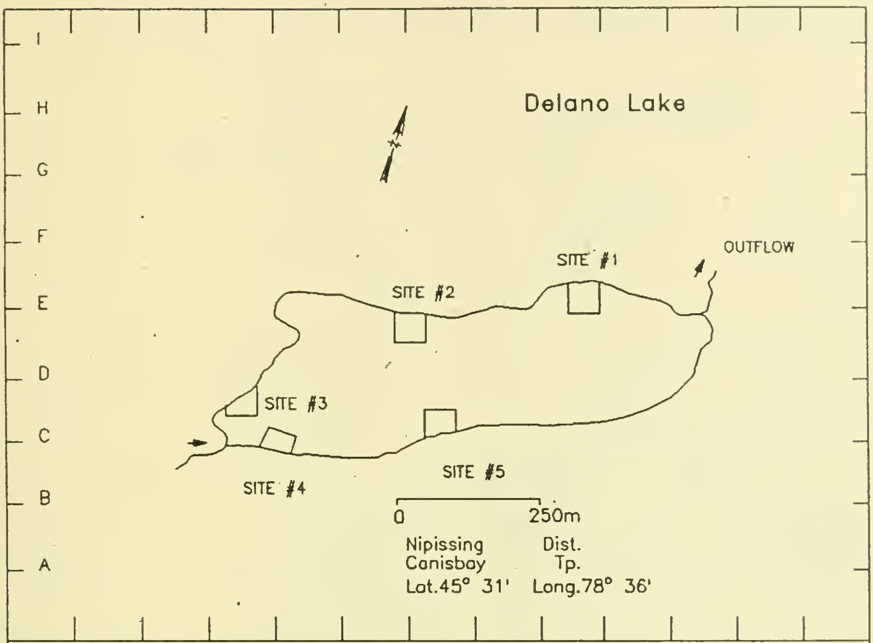
APPENDIX 2

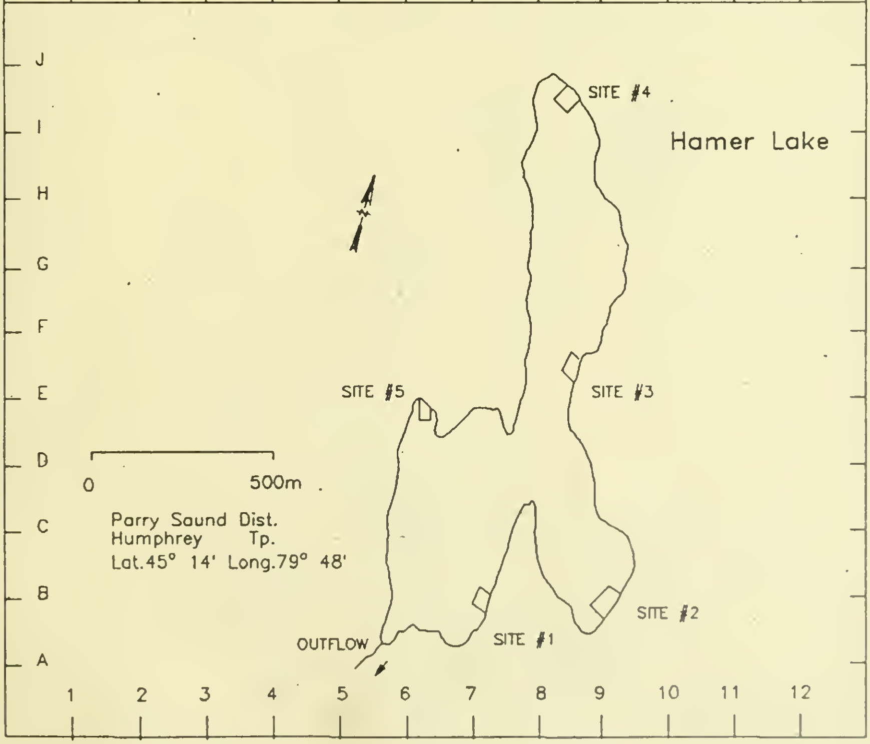
MAPS OF THE STUDY LAKES

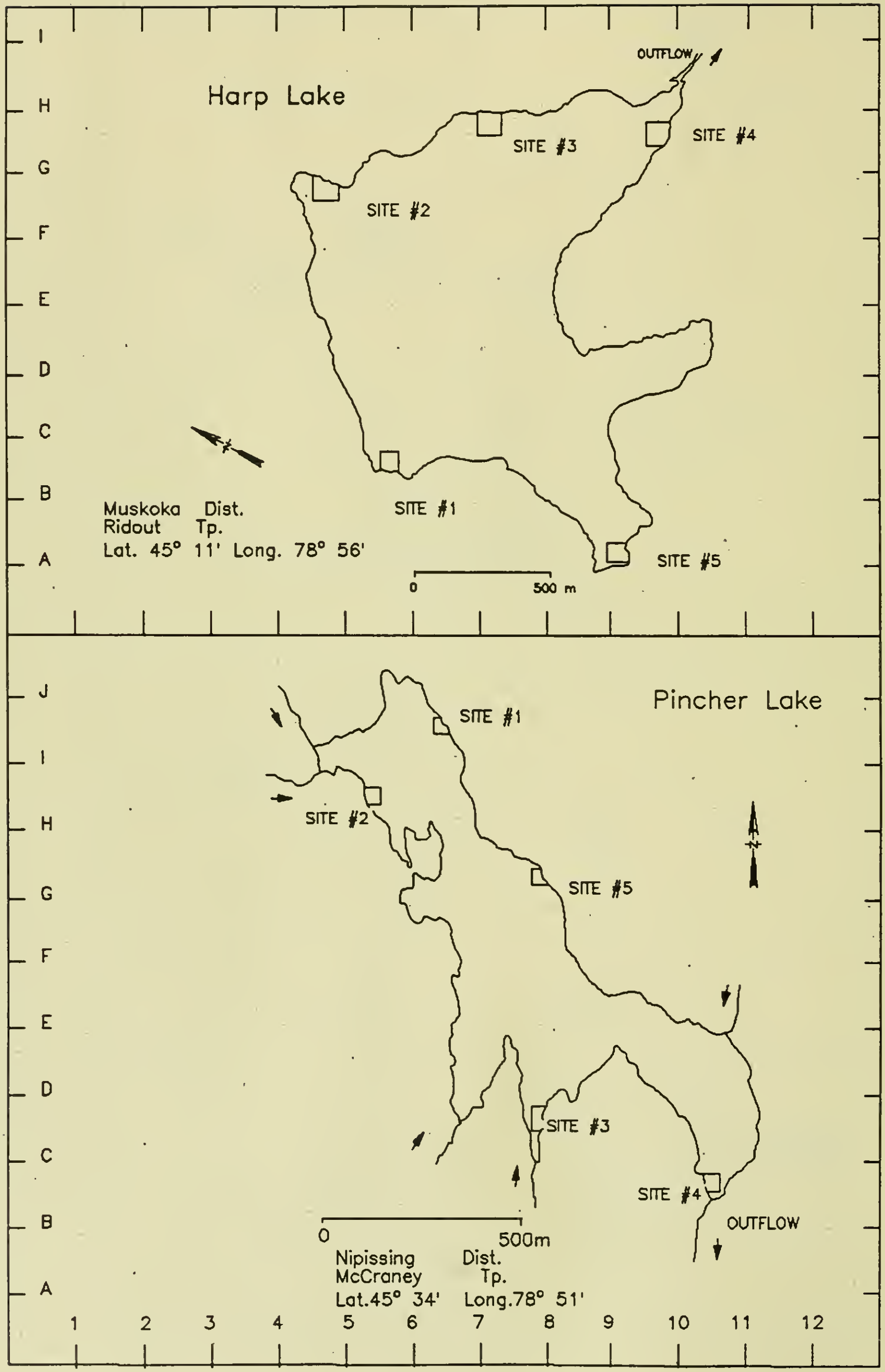

Blue Chalk Lake
SITE #5
SITE #1
SITE #2
SITE #4
SITE #3
OUTFLOW
N
0
200m
Muskoka Dist.
Ridout Tp.
Lat.45° 12' Long.78° 56'
I
H
G
F
E
D
C
B
A
Clear Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
3
OUTFLOW
N
0
250m
Haliburton Co.
Sherborne Tp.
Lat.45° 11' Long.78° 43'
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12


Cradle Lake
SITE #2
OUTFLOW
SITE #1
SITE #3
SITE #4
SITE #5
0
200
Haliburton Co.
Lawrence Tp.
Lat.45° 28' Long.78° 35'
N
J
I
H
G
F
E
D
C
B
A


Crosson Lake
SITE #2
OUTFLOW
SITE #1
SITE #3
SITE #4
SITE #5
N
0
500m
Muskoka Dist.
Oakley Tp.
Lat. 45° 05' Long. 79° 02'
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12


Delano Lake
I
H
G
F
E
D
C
B
A
OUTFLOW
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
0
250m
Nipissing Dist.
Canisbay Tp.
Lat.45° 31' Long.78° 36'


Hamer Lake
J
I
H
G
F
E
D
C
B
A
SITE #4
SITE #3
SITE #5
SITE #2
SITE #1
OUTFLOW
0
500m
Parry Sound Dist.
Humphrey Tp.
Lat.45° 14' Long.79° 48'
1
2
3
4
5
6
7
8
9
10
11
12


Harp Lake
OUTFLOW
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
Muskoka Dist.
Ridout Tp.
Lat. 45° 11' Long. 78° 56'
0
500 m
Pincher Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
0
500m
Nipissing Dist.
McCraney Tp.
Lat.45° 34' Long.78° 51'
A
B
C
D
E
F
G
H
I
J
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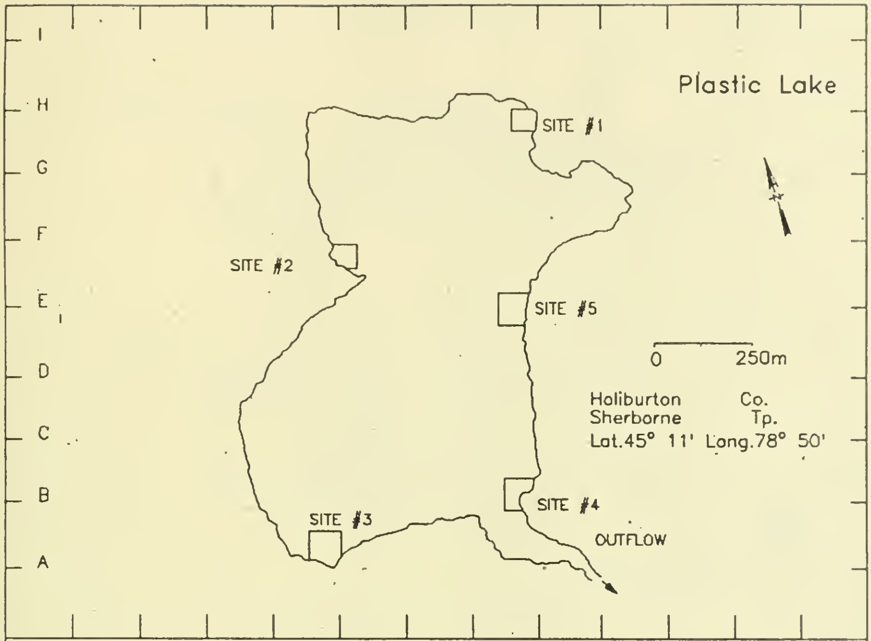
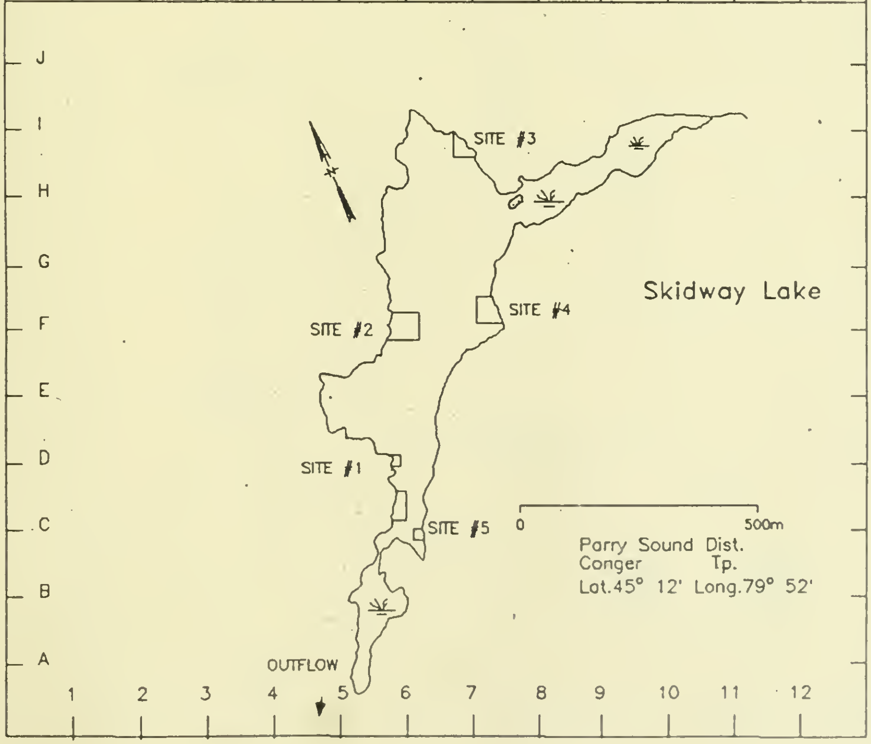

I
H
G
F
E
D
C
B
A
Plastic Lake
SITE #1
SITE #2
SITE #5
SITE #4
SITE #3
OUTFLOW
0
250m
Haliburton Co.
Sherborne Tp.
Lat.45° 11' Long.78° 50'


J
I
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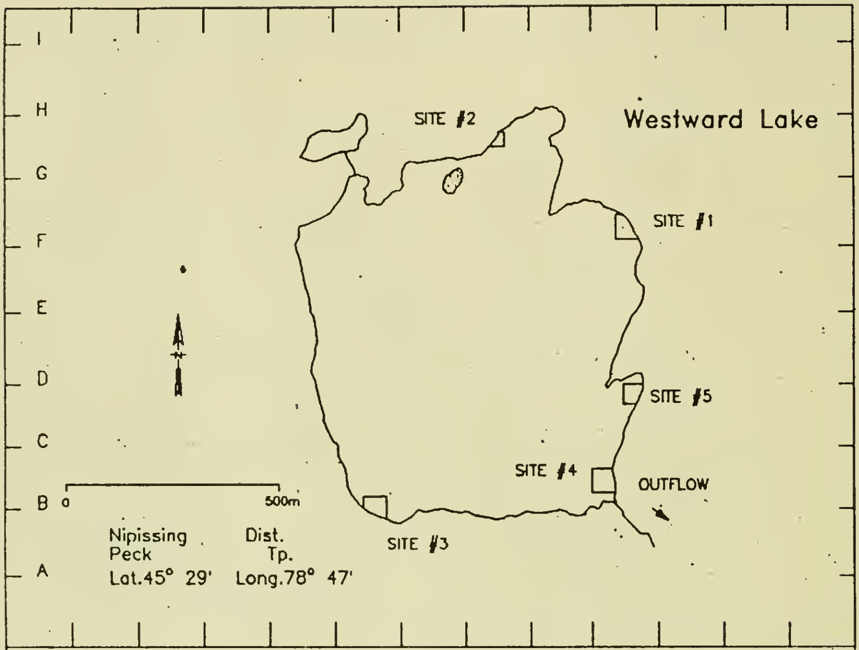
11
12
SITE #3
Skidway Lake
SITE #4
SITE #2
SITE #1
SITE #5
0
500m
Parry Sound Dist.
Conger Tp.
Lat.45° 12' Long.79° 52'
OUTFLOW


Westward Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
N
0
500m
Nipissing Dist.
Peck Tp.
Lat.45° 29' Long.78° 47'
A
B
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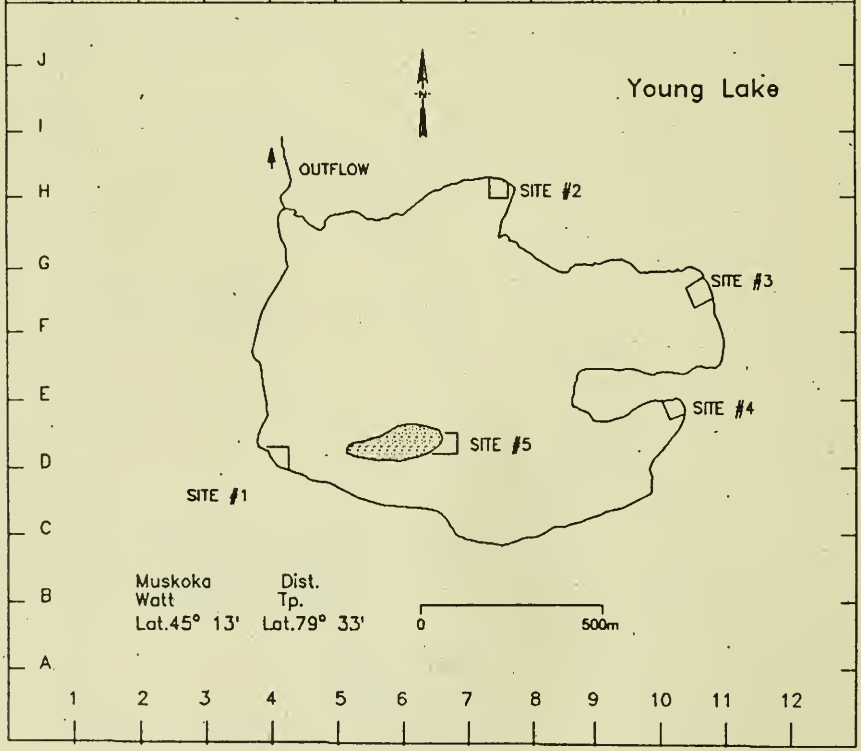
Young Lake
N
OUTFLOW
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
Muskoka Dist.
Watt Tp.
Lat.45° 13' Lat.79° 33'
0
500m
A
B
C
D
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APPENDIX 3

LAKE INVENTORY DATA SUMMARIES WITH SAMPLING SITE DESCRIPTIONS

Substrate types:
LOS - highly organic floculent
CSD - coarse sand
SLT - silt
COB - cobble
PEB - pebbles
BON - boulders
BDR - bedrock

BLUE CHALK

Drainage System	Black River drainage watershed (2EC15). The outflow enters Red Chalk Lake which flows southward into the Pairo Lakes. The Pairo Lakes then flow to a creek enroute to the Black River which eventually reaches Lake Simcoe.
Geology	Minor till plain is the major surficial deposit (on average) at Blue Chalk, and the bedrock type is granitized biotite gneiss.
Crayfish Species	*Cambarus bartoni, Orconectes propinquus* and *Orconectes virilis* (Reid and David 1990).
Stresses	
Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 84.2 μeq $\cdot$L^{-1}).
Eutrophication:	Secchi depth measurements (mean value = 6.0 m) and the chemical parameter total phosphorus (ice-free mean value = 5.65 μeq $\cdot$L^{-1}) indicate that Blue Chalk Lake is oligotrophic.
Site #1 CSD COB	shoreline - t-brush, logs, birch, white pine, cedar and spruce trees. substrate - sand (50% of the site), rocks (40%), macro Eriocaulon coverage (5%) and 5% sticks.
Site #2 LOS	shoreline - logs, t-brush, birch and white pine trees. substrate - detritus (70%) and 30% logs/sticks.
Site #3 LOS	shoreline - t-brush, cedar, birch, white pine and balsam fir trees. substrate - detritus (65% of the site) and 35% stick/logs.
Site #4 CSD PEB LOS	shoreline - t-brush, logs, cedar, birch, white pine, maple and balsam fir trees substrate - sand/PEB (45% of the site), detritus (40%), sticks/logs 10%) and 5% macros.
Site #5 CSD	shoreline - t-brush, logs, birch, cedar, white pine and maple trees. substrate - sand (75% of the site), macros (20%) and 5% logs/sticks.

CLEAR LAKE

Drainage System	Cameron Lake drainage watershed (2HF08). The outflow enters Big Hawk Lake which flows southward to Halls Lake. Halls Lake flows through Boshkung, Mountain and Horseshoe Lakes enroute to the Gull River which eventually reaches Lake Simcoe and then Georgian Bay in Lake Huron (Reid and Snyder 1986).
Geology	The surficial cover is dominated by thin till and rock ridges. The biotite gneiss is composed of metamorphosed beds of greywacke, arkose and sandstone (Reid and Snyder 1986). The bedrock type is biotite gneiss with traces of small marble interbeds.
Crayfish Species	*Cambarus bartoni* and *Orconectes propinquus.*
Stresses Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 7.8 $\mu eq \cdot L^{-1}$).
Eutrophication:	Cultural eutrophication is not a stress in Clear Lake. Secchi depth measurements (mean value = 7.8 m) and the chemical parameter total phosphorus (ice-free mean value = 3.8 $\mu eq \cdot L^{-1}$) indicate that Clear Lake is oligotrophic.
Site #1 CSD COB	shoreline - lab. tea, white pine and hemlock trees. substrate - sand (70% of the site) and 30% cobble.
Site #2 CSD COB	shoreline - bedrock, boulders, white pine and cedar trees. substrate - sand (70% of the site) and 30% rocks/cobble.
Site #3 CSD LOS	shoreline - lab. tea, white pine and cedar trees. substrate - sand (50% of the site), detritus (30%) and 20% macros.
Site #4 CSD COB	shoreline - lab. tea and cedar trees. substrate - sand (60% of the site), macros (30%) and 10% rock.
Site #5 LOS	shoreline - bedrock, lab. tea, white pine and hemlock trees. substrate - detritus (70% of the site), Eriocaulon (20%) and 10% logs.

CRADLE LAKE

Drainage System	Upper Madawaska River watershed (2KD18). The outflow is south into Bonnechere Lake which flows into Phipps Lake and then on through a series of lakes which eventually lead to the Upper Madawaska River and on to the Ottawa River.
Geology	The surficial cover of the watershed consist of (22.7% of the area) by sand and gravel, underlined with 44.6% of unsubdivided veneer. Bedrock knobs account for 0.4% of the watershed. The bedrock in this watershed consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (100% of the land area).
Crayfish Species	*Cambarus bartoni.*
Stresses	
Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 9.4 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 7.7 m) and the chemical parameter total phosphorus (ice-free mean value = 6.2 $\mu eq \cdot L^{-1}$) indicate that Cradle Lake is oligotrophic.
Site #1 LOS CSD COB	shoreline - leather leaf, black spruce and tamarack trees. substrate - detritus (40% of the site), sand (35%), sticks & logs (20%) and 5% rocks.
Site #2 LOS	shoreline - leather leaf and tamarack trees. substrate - detritus (80% of the site) and 20% logs/sticks.
Site #3 COB PEB CSD LOS	shoreline - leather leaf. substrate - rock/stones (40% of the site), sand (30%), logs/sticks (25%) and 5% detritus.
Site #4 LOS	shoreline - black spruce, white pine, cedar and hemlock trees. substrate - detritus (80% of the site), and 20% logs/sticks.
Site #5 LOS	shoreline - "dead heads", cedar and hemlock trees. substrate - LOS (100% of the site).

CROSSON LAKE

Drainage System	Black River drainage watershed (2EC15). The outflow joins Clear Creek which flows southward into the Black River. The Black River then eventually reaches Lake Simcoe.
Geology	The surficial geology of Crosson Lake is composed of peat and ponded areas surrounded by expanses of thin till and rock ridges. The bedrock type in this basin is migmitite (0-30% mafic).
Crayfish Species	*Cambarus bartoni* and *Orconectes virilis.*
Stresses	
Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 9.0 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 3.5 m) and the chemical parameter total phosphorus (ice-free mean value = 10.2 $\mu eq \cdot L^{-1}$) indicate that Crosson Lake is mesotrophic.
Site #1 COB PEB CSD LOS	shoreline - mostly boulders & bedrock, T-brush, hemlocks, large pines, balsam firs, oaks and ferns. substrate - rocks & PEB (45% of the site), sand (45%), macros (5%) and 5% detritus.
Site #2 LOS COB CSD	shoreline - large rocks, T-brush, hemlocks, birches, oaks and floating logs. substrate - logs/sticks (60% of the site), detritus (20%), rock (10%), sand (5%) and 5% macros.
Site #3 CSD LOS	shoreline - T-brush, floating logs, birch, balsam fir and large pine trees. substrate - sand (60% of the site), detritus (20%), sticks (10%) and 10% macros (lily pads).
Site #4 CSD LOS	shoreline - marsh like area (T-brush back about 40'), cedar, tall pines, hemlock, birch and floating logs. substrate - sand (30% of the site), sticks (30%), detritus (30%) and 10% macros (arrowheads & lily pads).
Site #5 LOS COB CSD	shoreline - mostly hemlock, two yellow birches, ferns, and fallen trees. substrate - detritus (50% of the site), macros (20%), rocks (10%), sand (10%) and 10% sticks.

DELANO LAKE

Drainage System	Upper Madawaska River drainage watershed (2KD1). The lake flows through Cache Lake and into the Upper Madawaska River. The Madawaska River flows east through a series of lakes to enter the Ottawa River at Arnprior.
Geology	The surficial cover consist of bedrock knobs and ridges with very thin, discontinuous drift cover (56.4%). Adjacent areas of thin drift with numerous outcrops (12.0% of the area) are accompanied by glaciofluvial outwash (12.7%). Organic depositions (8.8%) follow Delano Creek from the one pond (0.4% of the area) to Delano Lake. The bedrock geology consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (76.1% of the land area).
Crayfish Species	*Cambarus bartoni, Orconectes propinquus* and *Orconectes virilis.*
Stresses	
Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 46 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 3.8 m) and the chemical parameter total phosphorus (ice-free mean value = 7.1 $\mu eq \cdot L^{-1}$) indicate that Delano Lake is oligotrophic.
Site #1 LOS	shoreline - floating logs with sphagnum, leather leaf, black spruce and cedar trees. substrate - macrophytes (50% of the site), and 50% detritus.
Site #2 LOS COB	shoreline - leather leaf, cedar and hemlock trees. substrate - detritus (60% of the site), sticks (30%) and 10% rocks.
Site #3 LOS	shoreline - leather leaf, cedar and hemlock trees. substrate - detritus (70% of the site) and 30% sticks.
Site #4 LOS	shoreline - leather leaf, balsam fir and hemlock trees. substrate - detritus (90% of the site) and 10% sticks.
Site #5 BOU LOS	shoreline - leather leaf along shore, accompanied by hemlock trees. substrate - BOU (80% of the site) and 20% detritus.

HAMER LAKE

Drainage System	Lake Rosseau drainage watershed (2EB5). The outflow enters Silver Lake which flows south-east into Gordon Bay on Lake Joseph.
Geology	The bedrock geology of this watershed consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks.
Crayfish Species	*Orconectes virilis.*
Stresses	
Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 7.2 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 1.8 m) and the chemical parameter total phosphorus (ice-free mean value = 11.3 $\mu eq \cdot L^{-1}$) indicate that Hamer Lake is mesotrophic.
Site #1 LOS	shoreline - grasses, labrador tea, several dead trees, pine and birch trees. substrate - detritus (60%), Eriocaulon and arrow heads (35%) and 5% logs.
Site #2 LOS CSD	shoreline - submerged ferns, labrador tea, floating grasses, logs, dead fallen trees, pine, hemlock and snull pie/hemlock trees. substrate - macros: lilypads and Eriocaulon (40%), detritus (25%), sand (20%) and 15% logs.
Site #3 BDR	shoreline - labrador tea, grasses, floating logs, large rocks, hemlock and white pine trees. substrate - macros: arrow-head and Eriocaulon (40%), rock shelf (30%), BDR (20%) and 10% logs.
Site #4 SLT LOS COB	shoreline - few rocks along shoreline, labrador tea, grasses, white pines, oaks and maple. substrate - SLT/detritus (40%), macrophytes Ericocaulon (40%), rocks (10%) and 10% sticks.
Site #5 LOS	shoreline - tall pines, hemlock trees, labrador tea, grasses, ferns, birch trees, floating logs and several dead trees. substrate - detritus (50%), sticks/logs (25%) and macros: lilypads (25%).

HARP LAKE

Drainage System	Upper North Branch Muskoka River drainage watershed (2EB13). The outflow enters Peninsula Lake which flows south-west to Fairy Lake. Fairy Lake then flows into the North Branch Muskoka River. The Muskoka and Moon River system finally enters into Georgian Bay on Lake Huron.
Geology	Minor till plain is the major surficial deposit at Harp Lake. The bedrock geology in this basin consist of granitized biotite and hornblende gneiss, diorite and amphibolite and schist.
Crayfish Species	*Cambarus bartoni* and *Orconectes propinquus.*
Stresses Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 68 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 3.8 m) and the chemical parameter total phosphorus (ice-free mean value = 7.1 $\mu eq \cdot L^{-1}$) indicate that Harp Lake is oligotrophic.
Site #1 LOS CSD	shoreline - t-brush, birch and balsam fir trees. substrate - detritus (35% of the site), macros (Eriocaulon, Lobelia and arrow heads, 25% coverage) and 20% sand.
Site #2 COB CSD	shoreline - rock face (15' high), hemlock, birch and pine trees. substrate - rocks and COB (65% of the site), sand (30%) and 5% macros (Eriocaulon).
Site #3 CSD COB	shoreline - brush, old stumps, cedar, pine, hemlock and birch trees. substrate - sand (70% of the site), rocks (20%), sticks (5%) and 5% macros (Eriocaulon).
Site #4 CSD COB	shoreline - t-brush, floating logs, yellow birch, cedar and balsam firs. substrate - sand (40% of the site), macros (Eriocaulon coverage 40%), rocks (10%) and 10% sticks.
Site #5 LOS COB PEB CSD	shoreline - hemlock, yellow birch, white birch and cedar trees. substrate - sticks & logs (40% of the site), detritus (25%), rocks/PEB (20%), macros (10%) and 5% sand.

PINCHER LAKE

Drainage System	Moon River and Go Home River watershed (2EB13). The outflow runs southwest to Clara Lake which flows through a series of lakes which eventually leads to Lake Huron.
Geology	The surficial cover is dominated (61.8% of the area) by bedrock knobs and ridges, with very thin discontinuous drift cover. Sections of till account for 19.1% of the watershed. Pond areas cover 2.4%, and swamp and organic deposits cover 2.7% of the watershed. The bedrock geology consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (96.7% of the land area).
Crayfish Species	*Cambarus bartoni.*
Stresses	
Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = -1 μeq $\cdot$L^{-1}).
Eutrophication:	Secchi depth measurements (mean value = 5.3 m) and the chemical parameter total phosphorus (ice-free mean value = 7.5 μeq $\cdot$L^{-1}) indicate that Pincher Lake is oligotrophic.
Site #1 COB LOS	shoreline - leather leaf, cedar, black spruce and tamarack trees. substrate - rocks (40% of the site), detritus (30%) and 30% sticks.
Site #2 LOS	shoreline - leather leaf. substrate - detritus (80% of the site), and 20% sticks.
Site #3 LOS CSD COB	shoreline - leather leaf, hemlock, cedar and black spruce. substrate - detritus (50% of the site), sand (20%), rocks (10%), sticks (10%) and 10% macrophytes.
Site #4 LOS COB	shoreline - leather leaf, hemlock, cedar and black spruce. substrate - detritus (55% of the site), sticks (40%) and 5% rocks.
Site #5 LOS	shoreline - leather leaf and cedar trees. substrate - logs/sticks (60% of the site), and 40% detritus.

PLASTIC LAKE

Drainage System	Cameron Lake drainage watershed (2HF10). The outflow runs south to St. Nora Lake. St. Nora Lake eventually flows through Boshkung, Mountain and Horseshoe Lakes en route to the Gull River which eventually reaches Lake Simcoe and then Georgian Bay in Lake Huron (Girard et al. 1985).
Geology	The surficial cover of the watershed is dominated by a shallow, discontinuous, sand basal till containing angular to sub-angular boulders (Girard et al. 1985). The bedrock is an erosion and weather resistant gneiss, with a substantial igneous component. A small meta-gabbro plug appears on the east shoreline of the lake.
Crayfish Species	No crayfish were caught in the 1988 study .
Stresses Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 12 $\mu eq \cdot L^{-1}$).
Eutrophication:	Cultural eutrophication is not a stress. Secchi depth measurements (mean value = 6.1 m) and the chemical parameter total phosphorus (ice-free mean value = 5.1 $\mu eq \cdot L^{-1}$) indicate that Plastic Lake is oligotrophic.
Site #1 COB LOS CSD	shoreline - medium size rocks, "dead heads", white pine, cedars and white birch. substrate - rocks/sticks (50%), detritus (20%), sand (10%) and 10% macrophytes Eriocaulon.
Site #2 LOS	shoreline - labrador tea, flat rock, large dead trees and saplings of white pine. substrate - mixture of LOS and detritus, accompanied with 60% macrophytes.
Site #3 LOS	shoreline - located near the mouth of the stream (pc1). The shoreline consists of large flat rocks with lots of vegetation (several species of grasses). substrate - logs (40% of the site) and 30% macrophyte Eriocaulon.
Site #4 COB CSD SLT	shoreline - rocky bottom accompanied by "dead heads". The type of trees to be seen were hemlock, white pine, cedar and labrador tea (type of shrub). substrate - rocks (50%), sand/SLT (20%), macrophytes (20%) and

10% logs/boulders.

Site #5
LOS COB BOU

shoreline - The shoreline contains bedrock up to the waterline. The types of trees to be seen were hemlocks and large white pines.
substrate - logs/sticks (50%), rocks/BOU (30%) and 20% macrophytes.

SKIDWAY LAKE

Drainage System	Moon River and Go Home River watershed (2EB2). The outflow runs south to Code Lake and eventually drains into Lake Huron via a variety of small lakes.
Geology	The surficial cover is dominated by thin drift (83.3%), while the remaining 16.7% is lake surface area. The bedrock geology in this watershed consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (100% of the land area).
Crayfish Species	*Orconectes virilis.*
Stresses	
Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = -4.8 $\mu eq \cdot L^{-1}$).
Eutrophication:	Cultural eutrophication is not a stress. Secchi depth measurements (mean value = 4.4 m) and the chemical parameter total phosphorus (ice-free mean value = 6.7 $\mu eq \cdot L^{-1}$) indicate that Skidway Lake is oligotrophic.
Site #1 LOS	shoreline - leather leaf, hemlock and red oak trees. substrate - detritus (90% of the site), and 10% sticks/logs.
Site #2 LOS	shoreline - stumps, sticks, hard stem bulrush and hemlock trees. substrate - hard stem bulrush (50% of the site).
Site #3 LOS	shoreline - leather leaf, hemlock and red oak trees. substrate - detritus (65% of the site), and 35% sticks.
Site #4 LOS	shoreline - water lily, arrow heads, leather leaf, white pine and hemlock trees. substrate - detritus (70% of the site), sticks (20%) and 10% macrophytes.
Site #5 LOS CSD	shoreline - leather leaf flood plain with sticks and logs. substrate - detritus and sand.

WESTWARD LAKE

Drainage System	Oxtongue River drainage watershed (2EB11). Westward flows through a pond and enters the Oxtongue River. The flow then continues through to Lake of Bays and into the South Muskoka River. The Muskoka and Moon River system finally enters into Georgian Bay on Lake Huron.
Geology	The surficial cover is dominated by bedrock knobs and ridges with very thin, discontinuous drift (49.4%). Adjacent areas of thin drift with numerous outcrops (17.6% of the area) are accompanied by glaciofluvial outwash (4.9%). The only pond which is located at the north end of Westward Lake accounts for 0.5% of the watershed. The bedrock geology consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (93.1% of the land area).
Crayfish Species	*Cambarus bartoni* and *Orconectes propinquus.*
Stresses Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 42.1 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 6.4 m) and the chemical parameter total phosphorus (ice-free mean value = 4.4 $\mu eq \cdot L^{-1}$) indicate that Westward Lake is oligotrophic.
Site #1 LOS CSD	shoreline - cedar and black spruce trees. substrate - thin veneer detritus (50% of the site), sticks/logs (30%) and 20% exposed sand.
Site #2 LOS	shoreline - cedar and black spruce trees. substrate - sticks/logs (100% of the site detritus).
Site #3 CSD LOS COB	shoreline - cedar trees. substrate - sand (40% of the site), detritus (40%), rocks (10%) and 10% sticks/logs.
Site #4 COB CSD	shoreline - leather leaf and black spruce trees. substrate - rocks (80% of the site), sand (10%) and 10% sphagnum moss.
Site #5 LOS COB	shoreline - leather leaf, cedar, white pine and black spruce trees. substrate - detritus, logs/sticks and rocks (percentages unknown).

YOUNG LAKE

Drainage System	Skeleton River drainage watershed (2EB7). The outflow joins Skeleton River which flows into Skeleton Bay on Lake Rosseau.
Geology	The bedrock geology in this watershed consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks.
Crayfish Species	*Cambarus bartoni* and *Orconectes propinquus.*
Stresses Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 90.2 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 5.7 m) and the chemical parameter total phosphorus (ice-free mean value = 7.5 $\mu eq \cdot L^{-1}$) indicate that Young Lake is oligotrophic.
Site #1 CSD PEB SLT LOS	shoreline - grasses, white pine, birch, cedar, balsam fir and maple trees. substrate - macros (Eriocaulon mats, coverage 40%), sand/PEB (30%), SLT/detritus (25%) and 5% sticks.
Site #2 CSD LOS	shoreline - t-brush, floating logs, white pine, oak, birch and balsam fir trees. substrate - sand (85% of the site), detritus (10%) and 5% sticks.
Site #3 CSD LOS	shoreline - floating logs, cedar, birch, white pine and hemlock trees. substrate - sand (80% of the site), detritus (10%), sticks/logs (5%) and 5% macrophytes (Eriocaulon).
Site #4 SLT LOS	shoreline - t-brush, grasses, floating logs, cedar, birch and hemlock trees. substrate - SLT/detritus (45% of the site), macros (reeds and Eriocaulon mats, coverage 45%) and 10% logs.
Site #5 CSD LOS	shoreline - t-brush, white pine, cedar, birch and hemlock trees. substrate - sand (50% of the site), detritus (40%) and 10% logs/sticks.

APPENDIX 4

TAXONOMIC LIST AND ASSOCIATED DATABASE CODES

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
1	2026	COELENTERATA	HYDROZOA	HYDROIDA		HYDRIDAE			HYDRA		
100	2119	PLATYHELMINTHES	TURBELLARIA								
102	2123	PLATYHELMINTHES	TURBELLARIA	TRICLADIDA		PLANARIIDAE			DUGESIA		TIGRINA
200	2103	NEMATODA									
202	2106	NEMATODA		MONONCHIDA		MONONCHIDAE			ANATONCHUS		
203	2109	NEMATODA	ADENOPHOREA	DORYLAIMIDA	DORYLAIMINA	DORYLAIMIDAE			DORYLAIMUS		
204	2136	NEMATODA	ADENOPHOREA	ENOPLIDA	MERMITHOIDEA	MERMITHIDAE			DIVISPICULIMERIS		
206	2111	NEMATODA	ADENOPHOREA	ENOPLIDA	MERMITHOIDEA	MERMITHIDAE			HYDROMERMIS		
208	2112	NEMATODA	ADENOPHOREA	ENOPLIDA	MERMITHOIDEA	MERMITHIDAE			LIMNOMERMIS		
210	2108	NEMATODA	ADENOPHOREA	ENOPLIDA	MERMITHOIDEA	MERMITHIDAE			MERMITHIDAE		
212		NEMATODA	ADENOPHOREA	DORYLAIMIDA	DORYLAIMINA	DORYLAIMIDAE			PARACTINOLAIMUS		
300	263	ANNELIDA	OLIGOCHAETA								
302	237	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			ARCTEONAIS		LOMONDI
303	278	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			AULODRILUS		PIGUETI
304	224	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		ENCHYTRAEIDAE			CERNOSVITOVIELLA		
305	227	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			ILYODRILUS		TEMPLETONI
306	273	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			LIMNODRILUS		CLAPAREDEIANUS
308	277	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			LIMNODRILUS		HOFFMEISTERI
310	223	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			LIMNODRILUS		UDEKEMIANUS
312	270	ANNELIDA	OLIGOCHAETA	LUMBRICULIDA		LUMBRICULIDAE			LUMBRICULUS		VARIEGATUS
314	267	ANNELIDA	OLIGOCHAETA	LUMBRICULIDA		LUMBRICULIDAE			LUMBRICULUS		
315	230	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			NAIS		COMMUNIS
316	259	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			NAIS		PSEUDOBTUSA
317	258	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			NAIS		SIMPLEX
318	235	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			STYLARIA		LACUSTRIS
319	240	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			SLAVINA		APPENDICULATA
320	268	ANNELIDA	OLIGOCHAETA	LUMBRICULIDA		LUMBRICULIDAE			STYLODRILUS		HERINGIANUS
322	239	ANNELIDA	OLIGOCHAETA	TUBIFICIDA		TUBIFICIDAE			TASSERKIDRILUS		HARMANI
324	2137	ANNELIDA	OLIGOCHAETA	TUBIFICIDA		TUBIFICIDAE			TUBIFICIDAE		
326	2138	ANNELIDA	OLIGOCHAETA	TUBIFICIDA		TUBIFICIDAE					
327	246	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			UNCINAIS		UNCINATA
328	233	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			VEJDOVSKYELLA		COMATA
329	256	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			NAIS		VARIABILIS
400	207	ANNELIDA	HIRUDINEA								
402	199	ANNELIDA	HIRUDINEA	PHARYNGOBDELLIDA		ERPOBDELLIDAE			ERPOBDELLA		PUNCTATA
404	214	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			GLOIOBDELLA		ELONGATA
405	195	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			GLOSSIPHONIA		COMPLANATA
406	211	ANNELIDA	HIRUDINEA	GNATHOBDELLIDA		HIRUDINIDAE			HAEMOPIS		MARMORATA
408	216	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			HELOBDELLA		STAGNALIS
409	209	ANNELIDA	HIRUDINEA	GNATHOBDELLIDA		HIRUDINIDAE			MACROBDELLA		DECORA
410	201	ANNELIDA	HIRUDINEA	PHARYNGOBDELLIDA		ERPOBDELLIDAE			NEPHELOPSIS		OBSCURA
412	190	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			PLACOBDELLA		
414	188	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			PLACORDELLA		MULTILINEATA
416	191	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			PLACOBDELLA		ORNATA
418	189	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			PLACOBDELLA		PICTA

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
500	621	ARTHROPODA	CRUSTACEA	PERACARIDA	ISOPODA						
502	622	ARTHROPODA	CRUSTACEA	PERACARIDA	ISOPODA	ASELLIDAE			ASELLUS		FORBESI
600	338	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA						
602	342	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA	CRANGONYCTIDAE			CRANGONYX		GRACILIS
604	619	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA	CRANGONYCTIDAE			CRANGONYX		LAURENTIANUS
606	339	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA	TALITRIDAE			HYALELLA		AZTECA
608	337	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA	PONTOPOREIIDAE			DIPOREIA		HOYI
700	2139	ARTHROPODA	CRUSTACEA	DECAPODA							
701	616	ARTHROPODA	CRUSTACEA	EUCARIDA	DECAPODA	CAMBARIDAE	CAMBARINAE		CAMBARUS		BARTONI
702	329	ARTHROPODA	CRUSTACEA	EUCARIDA	DECAPODA	CAMBARIDAE	CAMBARINAE		CAMBARUS	PUNCTICAMBARUS	ROBUSTUS
704	612	ARTHROPODA	CRUSTACEA	EUCARIDA	DECAPODA	CAMBARIDAE	CAMBARINAE		ORCONECTES		PROPINQUIS
706	613	ARTHROPODA	CRUSTACEA	EUCARIDA	DECAPODA	CAMBARIDAE	CAMBARINAE		ORCONECTES		VIRILIS
800	279	ARTHROPODA	ARACHNOIDEA	ACARIFORMES							
802	661	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	ARRENURUS	AMERICANUS
804	281	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	ARRENURUS	AURICULARIS
806	282	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	MEGARRENURUS	APETIOLATUS
808	662	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	MEGARRENURUS	CARDIACUS
810	659	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	MEGARRENURUS	MEGALURUS
812	323	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRODROMIDAE			ATRACTIDES		
814	320	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	UNIONICOLIDAE			HUITFELDTIA		RECTIPES
816	645	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRODROMIDAE			HYDRODROMA		AMERICANUS
817	649	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRODROMIDAE			HYDRODROMA		DESPICIENS
818	296	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRODROMIDAE			HYGROBATES		LONGIPALPIS
820	308	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYGROBATIDAE			HYGROBATES		NEOCALLIGER
822	651	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	LEBERTIIDAE			LEBERTIA		DISTINCTA
824	653	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	LIMNESIIDAE			LIMNESIA		MACULATA
826	648	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	LIMNESIIDAE			LIMNESIA		UNDULATA
827	654	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	LIMNOCHARIDAE			LIMNOCARES		
828	306	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRYPHANTIDAE			PSEUDOHYDRYPHANTES		ORBICULARIS
830	655	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	UNIONICOLIDAE			UNIONICOLA	CRASSIPES	LAURENTIANA
832	317	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	MEGARRENURUS	BIRGEI
834	2140	ARTHROPODA	ARACHNIDA	HYDRACARINA	ARRENURIDAE				ARRENURUS	MEGALURACARUS	ELEVATUS
900	416	ARTHROPODA	INSECTA	COLLEMBOLA							
902	430	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	ISOTOMIDAE			FOLSOMIA		
904	421	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	PODURIDAE			HYPOGASTRURA		
905	2141	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	PODURIDAE			HYPOGASTRURA		VIATICA
906	422	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	ONYCHIURIDAE			ISOTOMURUS	HYDROISOTOMA	
908	2142	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	ISOTOMIDAE			METISOTOMA		
1000	1186	ARTHROPODA	INSECTA	EPHEMEROPTERA							
1002	1228	ARTHROPODA	INSECTA	EPHEMEROPTERA		HEPTAGENIIDAE	ARTHROPLEINAE		ARTHROPLEA		BIPUNCTATA
1004	2143	ARTHROPODA	INSECTA	EPHEMEROPTERA		CAENIDAE			CAENIS		DIMINUTA
1005	1156	ARTHROPODA	INSECTA	EPHEMEROPTERA		CAENIDAE			CAENIS		PUNCTATA
1006	1214	ARTHROPODA	INSECTA	EPHEMEROPTERA		LEPTOPHLEBIIDAE			CHOROTERPES		BASALIS
1007	1165	ARTHROPODA	INSECTA	EPHEMEROPTERA		BAETIDAE			CLOEON		RUBROPICTUM
1008	1280	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERIDAE			EPHEMERA		SIMULANS
1009	2153	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERELLIDAE			EURLYOPHELLA		LUTULENTA
1012	1299	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERELLIDAE			EURYLOPHELLA		BICOLOR
1014	1273	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERELLIDAE			EURYLOPHELLA		TEMPORALIS
1016	1281	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERIDAE			HEXAGENIA		LIMBATA
1021	1162	ARTHROPODA	INSECTA	EPHEMEROPTERA		SIPHLONURIDAE	SIPHLONURINAE		SIPHLONURUS		ALTERNATUS
1024	1187	ARTHROPODA	INSECTA	EPHEMEROPTERA		METRETOPODIDAE			SIPHLOPLECTON		BASALE

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MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
1026	1227	ARTHROPODA	INSECTA	EPHEMEROPTERA		HEPTAGENIIDAE	HEPTAGENIINAE		STENACRON		INTERPUNCTATUM
1032	1199	ARTHROPODA	INSECTA	EPHEMEROPTERA		LEPTOPHLEBIIDAE			LEPTOPHLEBIA		INTERMEDIA
1100	1577	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE					
1101	1498	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	AESHNINAE		AESHNA		CANADENSIS
1102	1495	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	AESHNINAE		AESHNA		EREMITA
1104	1573	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	AESHNINAE		AESHNA		UMBROSA
1105	1590	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ARGIA		VIOLACEA
1106	1503	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	GOMPHAESCHINAE		BASIAESCHNA		JANATA
1108	1501	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	GOMPHAESCHINAE		BOYERIA		GRAFIANA
1109	1539	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			CELITHEMIS		EPONINA
1110	1481	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			CHROMAGRION		CONDITUM
1112	1487	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULEGASTRIDAE			CORDULEGASTER		
1114	1561	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULIIDAE			CORDULIA		SHURTLEFFI
1116	1523	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	MACROMIIDAE			DIDYMOPS		TRANSVERSA
1117	2144	ARTHROPODA	INSECTA	ODONATA		GOMPHIDAE			DROMOGOMPHUS		SPINOSUS
1118	1591	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		CYATHIGERUM
1119	1592	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		BOREALE
1120	1596	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		EXSULANS
1122	1461	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		HAGENI
1124	1462	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		VESPERUM
1126	1539	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	GOMPHIDAE	HAGENIINAE		HAGENIUS		BREVISTYLUS
1128	1544	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	GOMPHIDAE	GOMPHINAE		GOMPHUS	GOMPHUS	EXILIS
1130	1474	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ISCHNURA		VERTICALIS
1132	1492	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LIBELLULA		JULIA
1133	1470	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	LESTIDAE			LESTES		DISJUNCTUS
1134	1469	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	LESTIDAE			LESTES		VIGILAX
1135	1493	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LIBELLULA		QUADRIMACULATA
1136	1581	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LEUCORRHINIA		FRIGIDA
1138	1494	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LEUCORRHINIA		HUDSONICA
1140	1579	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LIBELLULA		INCESTA
1142	1518	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULIIDAE			SOMATOCHLORA		WILLIAMSONI
1144	1519	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULIIDAE			EPITHECA		CYNOSURA
1146	1524	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	MACROMIIDAE			MACROMIA		ILLINOIENSIS
1148	2145	ARTHROPODA	INSECTA	ODONATA		AESHNIDAE			NASIAESCHNA		PENTACA
1150	1565	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULIIDAE			SOMATOCHLORA		CINGULATA
1200	1613	ARTHROPODA	INSECTA	PLECOPTERA							
1201	1650	ARTHROPODA	INSECTA	PLECOPTERA		PERLODIDAE	ISOPERLINAE		ISOPERLA		MARLYNIA
1202	1698	ARTHROPODA	INSECTA	PLECOPTERA		NEMOURIDAE			NEMOURA		TRISPINOSA
1204	2159	ARTHROPODA	INSECTA	PLECOPTERA		NEMOURIDAE	NEMOURINAE		SOYEDINA		
1300	1402	ARTHROPODA	INSECTA	HEMIPTERA		BELOSTOMATIDAE					
1301	1381	ARTHROPODA	INSECTA	HEMIPTERA		NOTONECTIDAE			BUENOA		MACROTIBIALIS
1302	1455	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			CENOCORIXA		
1303	1404	ARTHROPODA	INSECTA	HEMIPTERA		BELOSTOMATIDAE			BELOSTOMA		FLUMINIUM
1304	2146	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			CORIXIDAE		
1306	1423	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		ATOPODONTA
1308	1437	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		KENNICOTTI
1310	1416	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		LOBATA
1312	1335	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		MICHIGANENSIS
1314	1418	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		VULGARIS
1315	1346	ARTHROPODA	INSECTA	HEMIPTERA		BELOSTOMATIDAE			LETHOCERUS		AMERICANUS
1316	1382	ARTHROPODA	INSECTA	HEMIPTERA		NOTONECTIDAE			NOTONECTA		INSULATA

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MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
1318	1384	ARTHROPODA	INSECTA	HEMIPTERA		NOTONECTIDAE			NOTONECTA		UNDULATA
1319	1432	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			PALMACORIXA		BUENOI
1320	1417	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	ARCTOSIGARA	DECORATELLA
1321	1395	ARTHROPODA	INSECTA	HEMIPTERA		NEPIDAE			RANATRA		FUSCA
1322	1423	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	ARCTOSIGARA	PENNIENSIS
1324	1341	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PHAEOSIGARA	COMPRESSOIDEA
1326	1340	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PHAEOSIGARA	MACKINACENSIS
1328	1426	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PHAEOSIGARA	MACROPALA
1329	2147	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PHAEOSIGARA	MISSISSIPPIENSIS
1330	1410	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PILEOSIGARA	DOUGLASENSIS
1332	1436	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	VERMISIGARA	DEFLECTA
1334	1421	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	VERMISIGARA	JOHNSONI
1335	1419	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	VERMICORIXA	MULLETTENSIS
1400	2157	ARTHROPODA	INSECTA	MEGALOPTERA							
1402	1615	ARTHROPODA	INSECTA	MEGALOPTERA		CORYDALIDAE			CHAULIODES		
1404	1616	ARTHROPODA	INSECTA	MEGALOPTERA		SIALIDAE			SIALIS		
1500	1604	ARTHROPODA	INSECTA	NEUROPTERA		HEMEROBIIDAE					
1502	1601	ARTHROPODA	INSECTA	NEUROPTERA		SISYRIDAE			CLIMACIA		AREOLARIS
1600	1715	ARTHROPODA	INSECTA	TRICHOPTERA							
1602	1713	ARTHROPODA	INSECTA	TRICHOPTERA		SERICOSTOMATIDAE			AGARODES		DISTINCTUS
1603	1807	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYOANEINAE		AGRYPNIA		IMPROBA
1604	1773	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		AGRYPNIA		VESTITA
1605	1804	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		AGRYPNIA		STRAMINEA
1608	1811	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		BANKSIOLA		SMITHI
1609	1808	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		BANKSIOLA		CROTCHI
1610	1864	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	ARTHRISPINDINI	CERACLEA		ALCES
1611	1810	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		BANKSIOLA		DOSSUARIA
1612	1937	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPTILIDAE	HYDROPTILINAE		HYDROPTILA		
1613	1861	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	ARTHRISPINDINI	CERACLEA		
1614	1909	ARTHROPODA	INSECTA	TRICHOPTERA		LEPIDOSTOMATIDAE			LEPIDOSTOA		
1615	1925	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPSYCHIDAE	DIPLECTRONINAE		DIPLECTRONA		MODESTA
1616	1981	ARTHROPODA	INSECTA	TRICHOPTERA		PSYCHOMYIIDAE	PSYCHOMYIINAE		LYPE		DIVERSA
1618	1758	ARTHROPODA	INSECTA	TRICHOPTERA		MOLANNIDAE			MOLANNA		ULMERINA-UNIOPHILA
1619	1899	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE			LEPTOCERIDAE		
1620	1932	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	MYSTACIDINI	MYSTACIDES		SEPULCHRALIS
1622	1862	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	LEPTOCERINI	NECTOPSYCHE		
1624	2148	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	LEPTOCERINI	NECTOPSYCHE		SP. 2
1626	2149	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	LEPTOCERINI	NECTOPSYCHE		SP. 3
1627	1827	ARTHROPODA	INSECTA	TRICHOPTERA		LIMNEPHILIDAE	LIMNEPHILINAE	LIMNOPHILINI	NEMOTAULIUS		HOSTILIS
1628	1967	ARTHROPODA	INSECTA	TRICHOPTERA		POLYCENTROPODIDAE	POLYCENTROPODINAE		NYCTIOPHYLAX		AFFINIS
1630	1865	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	OECETINI	OECETIS		CINERASCENS
1632	1929	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	OECETINI	OECETIS		
1642	2150	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPTILIDAE	HYDROPTILINAE		OXYETHIRA		SP. 2
1644	2230	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPTILIDAE	HYDROPTILINAE		OXYETHIRA		SP. 3
1645	1799	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		PHRYGANEA		
1646	2156	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPTILIDAE	HYDROPTILINAE		OXYETHIRA		SP, 4
1648	1983	ARTHROPODA	INSECTA	TRICHOPTERA		POLYCENTROPODIDAE	DISPSEUDOPSINAE		PHYLOCENTROPUS		
1650	1885	ARTHROPODA	INSECTA	TRICHOPTERA		LIMNEPHILIDAE	LIMNEPHILINAE	LIMNEPHILINI	PLATYCENTROPUS		
1652	2231	ARTHROPODA	INSECTA	TRICHOPTERA		POLYCENTROPODIDAE	POLYCENTROPODINAE		POLYCENTROPUS		SP. 1
1654	2232	ARTHROPODA	INSECTA	TRICHOPTERA		POLYCENTROPODIDAE	POLYCENTROPODINAE		POLYCENTROPUS		SP. 2

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
1656	1798	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		PTILOSTOMIS		OCELLIFERA
1658	1889	ARTHROPODA	INSECTA	TRICHOPTERA		LIMNEPHILIDAE	LIMNEPHILINAE	LIMNEPHILINI	PYCNOPSYCHE		
1662	1933	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	MYSTACIDINI	TRIAENODES		SP. 1
1664	1933	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	MYSTACIDINI	TRIAENODES		SP. 2
1666	1873	ARTHROPODA	INSECTA	TRICHOPTERA		LIMNEPHILIDAE			LIMNEPHILIDAE		
1700	2233	ARTHROPODA	INSECTA	LEPIDOPTERA							
1701	2236	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	SCHOENOBIINAE		ACENTRIA		SP. 3
1702	2234	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	SCHOENOBIINAE		ACENTRIA		SP. 1
1703	2235	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	SCHOENOBIINAE		ACENTRIA		SP. 2
1704	1623	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	CRAMBINAE		CRAMBUS		
1705	2237	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	CRAMBINAE		CRAMBUS		SP. 2
1706	1705	ARTHROPODA	INSECTA	LEPIDOPTERA		GEOMETRIDAE			GEOMETRIDAE		
1708	2238	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	NYMPHULINAE		EOPARARGYRACTIS		
1709	1621	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	NYMPHYLINAE		PARAPONYX		
1800	2239	ARTHROPODA	INSECTA	COLEOPTERA							
1801	410	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			AGABUS		ANTHRACINUS
1802	2240	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			AGABUS		
1803	517	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			AGABUS		
1804	448	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			DINEUTUS		HORNI
1806	450	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			DINEUTUS		NIGRIOR
1808	571	ARTHROPODA	INSECTA	COLEOPTERA		CHRYSOMELIDAE			DONACIA		
1810	592	ARTHROPODA	INSECTA	COLEOPTERA		ELMIDAE			DUBIRAPHIA		MINIMA-VITATTA
1812	477	ARTHROPODA	INSECTA	COLEOPTERA		PSEPHENIDAE			ECTOPRIA		NERVOSA
1814	457	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		AFFINIS
1815	362	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			GRAPHODERUS		LIBERUS
1816	461	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		FROSTI
1817	2241	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		AERATUS
1818	463	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		LATILIMBUS
1820	462	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS	SAYI	(=LUGENS)
1822	442	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		PECTORALIS
1824	467	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		VENTRALIS
1828	490	ARTHROPODA	INSECTA	COLEOPTERA		HALIPLIDAE			HALIPLUS		PANTHERINUS
1830	348	ARTHROPODA	INSECTA	COLEOPTERA		HYDROPHILIDAE			HYDROCHUS		
1832	374	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			HYDROPORUS	NEOPORUS	UNDULATUS
1834	527	ARTHROPODA	INSECTA	COLEOPTERA		ELMIDAE			MACRONYCHUS		GLABRATUS
1836	478	ARTHROPODA	INSECTA	COLEOPTERA		MELYRIDAE			MELYRIDAE		
1837	2242	ARTHROPODA	INSECTA	COLEOPTERA		STAPHYLINIDAE			PHYTOSUS		
1838	485	ARTHROPODA	INSECTA	COLEOPTERA		HELODIDAE			PRIONOCYPHON		
1840	2243	ARTHROPODA	INSECTA	COLEOPTERA		SCIRTIDAE			SCIRTES		SP. 1
1842	2244	ARTHROPODA	INSECTA	COLEOPTERA		SCIRTIDAE			SCIRTES		SP. 2
1844	2245	ARTHROPODA	INSECTA	COLEOPTERA		SCIRTIDAE			SCIRTES		SP. 3
1846	573	ARTHROPODA	INSECTA	COLEOPTERA		ELMIDAE			STENELMIS		CRENATA
1848	345	ARTHROPODA	INSECTA	COLEOPTERA		HYDROPHILIDAE			BEROSUS		
1850	390	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			COPTOTOMUS		LONGULUS
1852	480	ARTHROPODA	INSECTA	COLEOPTERA		HELODIDAE			CYPHON		
1854	347	ARTHROPODA	INSECTA	COLEOPTERA		HYDROPHILIDAE			TROPISTERNUS		MIXTUS
1856	525	ARTHROPODA	INSECTA	COLEOPTERA		ELATERIDAE			ELATERIDAE		

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
2000	433	ARTHROPODA	INSECTA	DIPTERA							
2100	882	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE					
2101	763	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		ALLUAUDOMYIA		
2102	754	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	FORCIPOMYIINAE		ATRICHOPOGON		POLYDACTYLUS
2104	2216	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 1
2106	2218	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 1A
2108	2219	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 2/2A
2110	2220	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 3
2112	2221	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 4
2114	2152	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 5
2116	2222	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 6
2117	2224	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 8
2118	2223	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 7
2120	766	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		CULICOIDES		STELLIFER
2122	2225	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		CULICOIDES		SP. 1
2124	2226	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		CULICOIDES		SP. 2
2126	755	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	FORCIPOMYIINAE		FORCIPOMYIA		
2128	2227	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	DASYHELEINAE		DASYHELEA		SP. 1
2130	2228	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	DASYHELEINAE		DASYHELEA		SP. 2
2132	695	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		MALLOCHOHELEA		
2133	2229	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	DASYHELEINAE		DASYHELEA		SP. 3
2136	694	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE			MONOHELEA		
2140	696	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE			ISOHELEA		
2142	770	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PALPOMYIA		TIBIALIS
2144	771	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PALPOMYIA		SP.2
2146	2208	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 1
2148	2209	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 2
2150	2210	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 3
2152	2211	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 4
2153	2212	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 5
2154	683	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		STILOBEZZIA		
2155		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 6
2200	2003	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE					
2300	842	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	PODONOMINAE	PODONOMINI			
2302	724	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	PODONOMINAE	PODONOMINI	PAROCHLUS		KIEFFERI
2400	547	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE				
2401	898	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	MALLOCHI
2402	721	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	ASPERA
2403	2213	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		ABLABESMYIA	ASAYIA	ANNULATA
2404	805	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	MACROPELOPIINI	APSECTROTANYPUS		JOHNSONI
2405	897	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	PARAJANTA
2406	546	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		BRUNDINELLA		EUMORPHA
2407	2020	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	MONILIS
2408	549	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	COELOTANYPODINI	CLINOTANYPUS		PINGUIS
2409	2214	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		ABLABESMYIA	KARELIA	ILLINOENSIS
2410	811	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	CONCHAPELOPIA		
2411	798	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	PEELENSIS
2412	548	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	MACROPELOPIINI	DJALMABATISTA		PULCHER
2414	809	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	GUTTIPELOPIA		GUTTIPENNIS
2416	552	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LABRUNDINIA		PILOSELLA

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MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
2418	814	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LABRUNDINIA		NEOPILOSELLA
2419	800	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LABRUNDINIA		
2420	813	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LARSIA		CANADENSIS
2422	550	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LARSIA		INDISTINCTA
2424	812	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	NATARSIA		BALTIMOREUS
2426	802	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	MACROPELOPIINI	PROCLADIUS		
2428	796	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	THIENEMANNIMYIA		NORENA
2430	2018	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	TRISSOPELOPIA		OGEMAWI
2432	2215	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		ZAVRELIMYIA		SP. 1
2434	2203	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		ZAVRELIMYIA		
2500	714	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE	DIAMESINI			
2501	802	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	MACROPELOPIINI	PROCLADIUS		
2502	2204	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE		PROTANYPUS		RAMOSUS
2503	857	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE	PROTANYPINI	PROTANYPUS		RAMOSUS
2600	711	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE	PRODIAMENSINI			
2602	710	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE	PRODIAMENSINI	MONODIAMESA		BATHYPHILA
2700	840	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE				
2702	725	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		ACRIOTOPUS		
2704	839	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		BRILLIA		PARVA
2706	838	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		BRYOPHAENOCLADIUS		
2708	1327	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		LACUSTRIS
2710	1328	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		LOBATA
2711		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		BRILLIA		FLAVIFRONS
2712	539	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		SCUTELLATA
2714	2205	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		SP. 1
2716	2206	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		SP. 2
2717	2207	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		SP. 3
2718	1711	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	ALBIFORCEPS
2719	1136	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS		
2720	500	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	CYLINDRACEUS
2722	502	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	FESTIVELLUS
2724	501	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	CURTUS
2726	438	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	TREMULUS
2728	437	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	ISOCLADIUS	INTERSECTUS
2730	823	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	ISOCLADIUS	LARICOMALIS
2732	2155	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	ISOCLADIUS	SP. 1
2733	2154	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	ISOCLADIUS	SP. 2
2734	1709	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		DIPLOCLADIUS		
2736	1708	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		DOITHRIX		SP. 1
2737	2190	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		EPOICOCLADIUS		SP. 1
2738	1708	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		DOITHRIX		SP. 2
2739	822	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		EPOICOCLADIUS		FLAVENS
2740	496	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HELENIELLA		
2742	675	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HETEROTANYTARSUS		NUDALUS
2744	676	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HETEROTRISSOCLADIUS		CHANGI
2746	677	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HETEROTRISSOCLADIUS		HIRTAPEX
2748	821	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HYDROBAENUS		FUSISTYLUS
2749		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS		DISTINCTUS
2750	680	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		LIMNOPHYES		
2751	681	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS	NANOCLADIUS	INCOMPTUS
2752	719	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS	NANOCLADIUS	MINIMUS
2753		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS	PLECOPTERACOLUTHUS	DOWNSEI

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
2754	2191	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS	NANOCLADIUS	
2755		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARACRICOPTUS		
2756	1143	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		ORTHOCLADIUS	ORTHOCLADIUS	ANNECTENS
2757	2192	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARACLADIUS		
2758	2193	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAKIEFFERIELLA		SP. 1
2759	2194	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAKIEFFERIELLA		SP. 2
2760	2195	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAKIEFFERIELLA		SP. 3
2761	2196	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAKIEFFERIELLA		SP. 4
2762	1138	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAMETRIOCNEMUS		LUNDBECKI
2764	1141	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAPHAENOCLADIUS		NATHECUS
2766	1140	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAPHAENOCLADIUS		
2768	1144	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PLATYSMITTIA		
2769	2197	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	ALLOPSECTROCLADIUS	
2770	1727	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	MESOPSECTROCLADIUS	
2772	891	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	MONOPSECTROCLADIUS	CALCARATUS
2774	1729	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	PSECTROCLADIUS	LITOFILUS
2776	674	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	PSECTROCLADIUS	SIMULANS
2777	666	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	PSECTROCLADIUS	SORDIDELLUS
2778	1132	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSEUDORTHOCLADIUS		
2780	1131	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSEUDOSMITTIA		FORCIPATA
2781	2199	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSEUDOSMITTIA		SP. 2
2782	2198	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSEUDOSMITTIA		SP. 1
2784	667	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		RHEOCRICOTOPUS		
2786	1129	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		SMITTIA		
2788	1724	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		STACKELBERGINA		
2790	720	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		SYNORTHOCLADIUS		SEMIVIRENS
2792	1324	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		THIENEMANNIELLA		
2794	1325	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		TVETANIA		BAVARICA
2796	884	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		TVETANIA		DISCOLORIPES
2797	818	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		XYLOTOPUS		
2798	817	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		ZALUTSCHIA		OBSEPTA
2799	819	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		ZALUTSCHIA		SP. 1
2800	1120	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE				
2900	1120	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI			
2902	1113	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CLADOPELMA		
2904	793	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CHIRONOMUS	CAMPTOCHIRONOMUS	TENTANS
2906	669	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CHIRONOMUS		
2908	1999	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CRYPTOCHIRONOMUS		CONUS
2910	2001	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CRYPTOCHIRONOMUS		
2912	787	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DEMICRYPTOCHIRONOM	IRMAKIA	CUNEATUS
2914	791	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DICROTENDIPES		LEUCOSCELIS
2916	878	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DICROTENDIPES		MODESTUS
2917	2200	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DICROTENDIPES		NERVOSUS
2918	786	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DICROTENDIPES		TRITOMUS
2920	876	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	ENDOCHIRONOMUS		NIGRICANS
2922	2201	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	GLYPTOTENDIPES		SP. 1
2923	2202	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	GLYPTOTENDIPES		SP. 2
2924	2177	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	GLYPTOTENDIPES		
2925	2178	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	KIEFFERULUS		DUX

Appendix 4; Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
2926	1119	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	LAUTERBORNIELLA		AGRAYLOIDES
2927		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	GLYPTOTENDIPES		SP. 3
2928	1112	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	MICROTENDIPES		PEDELLUS
2930	784	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	NILOTHAUMA		BABIYI
2932	785	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	NILOTHAUMA		
2935	1117	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	OMISUS		CALEDONICUS
2936	783	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	OMISUS		PICA
2938	1125	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PAGASTIELLA		OSTANSA
2940	1127	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARACHIRONOMUS		ABORTIVUS
2942	778	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARACLADOPELMA		GALAPTERA
2944	690	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARACLADOPELMA		UNDINE
2946	854	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARACLADOPELMA		
2948	1106	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARALAUTERBORNIELLA		NIGROHALTERALIS
2950	1319	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARATENDIPES		ALBIMANUS
2952	1320	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARATENDIPES		NUDISQUAMA
2954	693	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PHAENOPSECTRA		
2956	895	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	PENTAPEDILUM	SORDEN
2958	1323	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	PENTAPEDILUM	TRITUM
2960	691	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		CONVICTUM
2962	2179	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 1
2964	2180	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 2
2966	2182	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 3
2968	2183	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 4
2970	779	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	TRIPODURA	SCALAENUM
2972	1321	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	TRIPODURA	SIMULANS
2974	855	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		ARTICAUDUS
2975	2189	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		SP. 1
2976	2163	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		SP. 2
2977	2164	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		SP. 3
2978	890	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	SERGENTIA		CORACINA
2979	2165	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		SP. 4
2980	1105	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	STENOCHIRONOMUS		HILARIS
2982	879	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	STICTOCHIRONOMUS		SP.1/3
2984	692	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PHAENOPSECTRA		FLAVIPES
2986	835	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	TRIBELOS		JUCUNDUM
2988	2167	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	ZAVRELIELLA		MARMORATA
2990	2185	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	POLYPEDILUM	FALLAX
2991	1322	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	POLYPEDILUM	ILLINOENSE
2992	2186	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	POLYPEDILUM	TRIGONUM
2993	2181	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 2A
2994	2184	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 5
2995	2187	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	TRIPODURA	SP. 1
2996	2166	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	STICTOCHIRONOMUS		SP. 2
2997	836	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	XENOCHIRONOMUS		XENOLABIS
2999	2188	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	TRIPODURA	SP. 2
3000	706	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI			
3002	867	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	CLADOTANYTARSUS		
3004	864	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	PARAPSECTRA		
3006	866	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	PARATANYTARSUS		
3008	873	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	STEMPELLINA		

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
3010	871	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	STEMPELLINELLA		
3012	700	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	TANYTARSUS		CURTICORNIS
3014	863	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	TANYTARSUS		
3016	2168	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	CHIRONOMIDAE		
3018	869	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	ZAVRELIA		
3100	731	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE					
3102	961	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			CHRYSOPS		ATER
3103	831	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			CHRYSOPS		EXCITANS
3104	2169	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			CHRYSOPS		SP. 1
3106	2158	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			CHRYSOPS		
3108	2170	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			TABANUS		
3109	2171	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			TABANUS		MARGINALIS
3200	1237	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE					
3202	1258	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		DACTYLOLABIS		
3204	1265	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		HEXATOMA		
3206	1033	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		LIMONIA		
3208	1145	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		ERIOPTERA		
3210	1064	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		ORMOSIA		
3211	1250	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		PEDICIA		
3212	2172	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE			TIPULA		SP. 1
3214	1244	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	TIPULINAE		TIPULA	NIPPOTIPULA	ABDOMINALIS
3216	2173	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE			TIPULA	YAMATOTIPULA	
3217	2174	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE			TIPULIDAE		SP. 1
3218	2151	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE			TIPULIDAE		SP. 2
3220	1262	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		GONOMYIA		
3302	2176	ARTHROPODA	INSECTA	DIPTERA		CECIDOMYIIDAE			CECIDOMYIIDAE		
3306	716	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	DIXIDAE			DIXELLA		
3308	2128	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	DOLICHOPODIDAE			DOLICHOPODIDAE		
3310	827	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	EMPIDIDAE			HEMERODROMIA		
3311	940	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	EMPIDIDAE			EMPIDIDAE		
3312	2160	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	PHORIDAE			PHORIDAE		
3314	2161	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	PLATYPEZIDAE			PLATYPEZA		SP. 1
3316	2162	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	PLATYPEZIDAE			PLATYPEZA		SP. 2
3318	1016	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	PTYCHOPTERIDAE			BATTACOMORPHA		
3320	1101	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	PSYCHODIDAE			PSYCHODIDAE		
3322	1238	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	THAUMALEIDAE			THAUMALEA		
3500	2027	MOLLUSCA	GASTROPODA								
3502	2064	MOLLUSCA	GASTROPODA	MESOGASTROPODA		HYDROBIIDAE			AMNICOLA		LIMOSA
3503	2061	MOLLUSCA	GASTROPODA	MESOGASTROPODA		VIVIPARIDAE			CAMPELOMA		DECISUM
3504	2036	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		ANCYLIDAE			FERRISSIA		FRAGILIS
3505	2059	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		PLANORBIDAE			GYRAULUS		PARVUS
3506	2040	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		PSYSIDAE			PHYSELLA	PHYSELLA	GYRINA
3508	2044	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		PLANORBIDAE			HELISOMA		ANCEPS
3510	2029	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		PLANORBIDAE			PLANORBULA		CAMPESTRIS
3512	2060	MOLLUSCA	GASTROPODA	MESOGASTROPODA		VALVATIDAE			VALVATA		LEWISI
3600	2077	MOLLUSCA	PELECYPODA								
3602	2092	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		CASERTANUM
3604	2090	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		FERRUGINEUM
3606	2086	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		LILLJEBORGI
3608	2093	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		ADAMSI
3610	2080	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		NITIOUM

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
3612	2081	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		VARIABILE
3614	2089	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		EQUILATERALE
3616	2102	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	SPHAERIINAE		MUSCULIUM		SECURIS
3618	2083	MOLLUSCA	PELECYPODA	VENEROIDA		UNIONIDAE			ANODONTA		
3620	2088	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		SUBTRUNCATUM
3622	2079	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	SPHAERIINAE		MUSCULIUM	LACUSTRE	JAYENSE
3700	760	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHAOBORIDAE					
3702	685	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHAOBORIDAE	CHAOBORINAE		CHAOBORUS	CHAOBORUS	AMERICANUS
3704	684	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHAOBORIDAE	CHAOBORINAE		CHAOBORUS	CHAOBORUS	FLAVICANS
3706		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHAOBORIDAE	CHAOBORINAE		CHAOBORUS	SAYOMYIA	PUNCTIPENNIS
3800	604	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CULICIDAE					
3801	2175	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CULICIDAE			MANSONIA		PERTUBANS

APPENDIX 5

FALL 1988 BENTHIC SPECIES LISTS FOR EACH LAKE

BLUE CHALK LAKE NOV 2 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA	5		7	1	1	14	2.8	3.0
Anatonchus sp.	3		5			8	1.6	2.3
Mermithidae	2		2	1	1	6	1.2	0.8
OLIGOCHAETA	26			10	6	42	8.4	10.7
Enchytraeidae	15			1	2	18	3.6	6.4
Ilyodrilus templetoni				7		7	1.4	3.1
Lumbriculus variegatus	5			2	3	10	2.0	2.1
Tubificidae + hairs	6				1	7	1.4	2.6
HIRUDINEA					1	1	0.2	0.4
Erpobdella punctata					1	1	0.2	0.4
AMPHIPODA	615	119	172	61	374	1341	268.2	226.9
Crangonyx gracilis					3	3	0.6	1.3
Hyalella azteca	615	119	172	61	371	1338	267.6	226.5
DECAPODA		1				1	0.2	0.4
Orconectes virilis		1				1	0.2	0.4
EPHEMEROPTERA	153	176	106	45	118	598	119.6	50.1
Caenis punctata	13	1	4	2	2	22	4.4	4.9
Eurylophella latulenta	1					1	0.2	0.4
Ephemera simulans	6			2	2	10	2.0	2.4
Eurylophella temporalis	45	64	42	17	7	175	35.0	22.9
Hexagenia limbata			2	20	10	32	6.4	8.6
Leptophlebia intermedia	88	96	58	4	97	343	68.6	39.4
Stenacron interpunctatum		14				14	2.8	6.3
Stenonema tripunctatum		1				1	0.2	0.4
ODONATA	22	5	18		38	83	16.6	15.0
Basiaeschna janata					1	1	0.2	0.4
Enallagma exsulans	14		6		19	39	7.8	8.5
Enallagma hageni	2	1	5		14	22	4.4	5.7
Hagenius brevistylus	1					1	0.2	0.4
Gomphus exilis	5	2	2			9	1.8	2.0
Ischnura verticalis			1		3	4	0.8	1.3
Leucorrhinia hudsonica					1	1	0.2	0.4
Libellula incesta		1	4			5	1.0	1.7
Somatochlora williamsoni		1				1	0.2	0.4
PLECOPTERA					1	1	0.2	0.4
Isoperla marlynia					1	1	0.2	0.4
TRICHOPTERA	25	9	5	9	28	76	15.2	10.5
Agarodes cf. distinctus	4					4	0.8	1.8
Limnephilidae					1	1	0.2	0.4
Molanna ulmerina-uniophila	1	1	2	1		5	1.0	0.7
Mystacides sepulchralis	4			2	1	7	1.4	1.7
Nectopsyche sp.3 nr. pavida	1				1	2	0.4	0.5
Oecetis sp.1	2		2		1	5	1.0	1.0
Oecetis sp.2	2					2	0.4	0.9
Oecetis sp.4 (?ovara)		2				2	0.4	0.9
Polycentropus sp.2	1	2	1	1		5	1.0	0.7
Pycnopsyche sp.2	8	2		4	23	37	7.4	9.2
Triaenodes sp.1		2		1		3	0.6	0.9
Triaenodes sp.2	2				1	3	0.6	0.9
LEPIDOPTERA	2					2	0.4	0.9
Eoparargyractis sp.	2					2	0.4	0.9
COLEOPTERA	40	4	6	10	18	78	15.6	14.7
Dubiraphia minima-vittata	14			9		23	4.6	6.5
Ectopria nervosa	1			1		2	0.4	0.5
Hydroporus (Neoporus) undulatus		1				1	0.2	0.4
Macronychus glabratus		3				3	0.6	1.3
Stenelmis crenata	25		5		18	48	9.6	11.3

BLUE CHALK LAKE NOV 2 1988

	SITE					TOTAL	MEAN	STD
TAXONOMIC NAME	1	2	3	4	5			
DIPTERA	320	126	424	206	229	1305	261.0	114.4
DIPTERA:Ceratopogonidae	11	3	7	20	21	62	12.4	7.9
Bezzia sp.1	4					4	0.8	1.8
Bezzia sp.1A	1					1	0.2	0.4
Bezzia sp.4					11	11	2.2	4.9
Bezzia sp.5					1	1	0.2	0.4
Bezzia sp.7					1	1	0.2	0.4
Dasyhelea sp.1 (pale head)	1				2	3	0.6	0.9
Probezzia sp.4				1		1	0.2	0.4
Probezzia sp.1	5	3	7	18	5	38	7.6	6.0
Probezzia sp.3				1		1	0.2	0.4
Stilobezzia sp.					1	1	0.2	0.4
DIPTERA:Chironomidae	308	123	417	186	198	1232	246.4	116.3
Subfam.-Podonominae					1	1	0.2	0.4
Parochlus kiefferi					1	1	0.2	0.4
Subfam.-Tanypodinae	166	67	153	93	65	544	108.8	47.8
Ablabesmyia (s.str.) spp.	3	4	43	4	3	57	11.4	17.7
Conchapelopia sp.	18	8	13		16	55	11.0	7.2
Djalmabatista pulcher	5	1		21	6	33	6.6	8.4
Labrundinia sp.1	1					1	0.2	0.4
Larsia canadensis	115	38	43	64	37	297	59.4	32.9
Procladius (s.lat.)spp.	11	3	39	1	2	56	11.2	16.0
Thienemannimyia norena	6	3		3		12	2.4	2.5
Zavrelimyia sp.	7	10	15		1	33	6.6	6.3
Subfam.-Prodiamesinae					3	3	0.6	1.3
Monodiamesa nr. bathyphila					3	3	0.6	1.3
Subfam.-Orthocladiinae	56	12	18	13	44	143	28.6	20.1
Corynoneura nr. scutellata		1				1	0.2	0.4
Epoicocladius sp. 1			1			1	0.2	0.4
Heterotrissocladius changi	3					3	0.6	1.3
Heterotrissocladius hirtapex			1	10	1	12	2.4	4.3
Limnophyes sp.	1		1			2	0.4	0.5
Parakiefferiella sp.2 (ELA)	1					1	0.2	0.4
Parametriocnemus lundbecki	1			1	6	8	1.6	2.5
Psectrocladius (s.str.) litofilus	48	2	9	1	32	92	18.4	20.7
Psectrocladius (s.str.) simulans	1	2	3		2	8	1.6	1.1
Xylotopus par		1			2	3	0.6	0.9
Zalutschia obsepta					1	1	0.2	0.4
Zalutschia sp.1	1	6	3	1		11	2.2	2.4
Subfam.-Chironominae	86	44	246	80	85	541	108.2	79.0
Tribe-Chironomini	58	43	142	61	42	346	69.2	41.6
Cryptochironomus conus	5	2	2	7	3	19	3.8	2.2
Cryptochironomus spp.		1				1	0.2	0.4
Dicrotendipes leucoscelis			1			1	0.2	0.4
Dicrotendipes modestus	1		46			47	9.4	20.5
Dicrotendipes tritomus	30		1		7	38	7.6	12.9
Lauterborniella agrayloides	2	2	1			5	1.0	1.0
Microtendipes pedellus	4	1	22	1	4	32	6.4	8.8
Nilothauma babiyi			2		1	3	0.6	0.9
Paratendipes cf. nudisquama			1			1	0.2	0.4
Phaenopsectra flavipes		3	2	1	2	8	1.6	1.1

BLUE CHALK LAKE NOV 2 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
Subfam.–Chironominae cont'd								
Tribe–Chironomini cont'd	1	2	3	4	5			
Polypedilum (Pentapedilum) sordens	3	1			3	7	1.4	1.5
Polypedilum (s.lat.) sp.2A	1					1	0.2	0.4
Polypedilum (s.lat.) sp.3	1					1	0.2	0.4
Polypedilum (s.str.) scalaenum	2	5			2	9	1.8	2.0
Polypedilum (Tripodura) simulans	3	1		1		5	1.0	1.2
Polypedilum (Tripodura) sp.1	1			20	15	36	7.2	9.6
Pseudochironomus articaudus		1		1		2	0.4	0.5
Pseudochironomus spp.		1			2	3	0.6	0.9
Stenochironomus hilaris	2	2		1	1	6	1.2	0.8
Stictochironomus sp.1/3	2			3	1	6	1.2	1.3
Stictochironomus sp.2				5		5	1.0	2.2
Tribelos jucundum	1	23	64	21	1	110	22.0	25.7
Tribe–Tanytarsini	28	1	104	19	43	195	39.0	39.4
Cladotanytarsus spp.	10		1	11	28	50	10.0	11.2
Paratanytarsus spp.	15	1			2	18	3.6	6.4
Stempellina sp.	2			1	11	14	2.8	4.7
Tanytarsus/Micropsectra spp.	1		103	7	2	113	22.6	45.0
DIPTERA:Tipulidae					8	8	1.6	3.6
Gonomyia sp.					8	8	1.6	3.6
DIPTERA:Misc.	1				2	3	0.6	0.9
Empididae:Hemerodromia sp.	1				2	3	0.6	0.9
GASTROPODA	1		1		1	3	0.6	0.5
Amnicola limosa			1			1	0.2	0.4
Gyraulus parvus					1	1	0.2	0.4
Ferrissia fragilis	1					1	0.2	0.4
PELECYPODA	2	1	5			8	1.6	2.1
Pisidium casertanum	2	1	2			5	1.0	1.0
Pisidium nitidum			3			3	0.6	1.3

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA				5		5	1	2.2
Anatonchus sp.				4		4	0.8	1.8
Mermithidae				1		1	0.2	0.4
OLIGOCHAETA	6	6	12	48	14	86	17.2	17.6
Enchytraeidae	2			14	4	20	4	5.8
Lumbriculus variegatus	3	1	12	15	4	35	7	6.1
Lumbriculidae	1	1				2	0.4	0.5
Tubificidae + hairs		4		19	6	29	5.8	7.8
HIRUDINEA	1		2			3	0.6	0.9
Erpobdella punctata			1			1	0.2	0.4
Helobdella stagnalis	1		1			2	0.4	0.5
AMPHIPODA	149	22	325	490	70	1056	211.2	193.8
Crangonyx laurentianus	1	20	25	55	24	125	25	19.4
Hyalella azteca	148	2	300	435	46	931	186.2	180.2
EPHEMEROPTERA	28	23	21	277	192	541	108.2	119.2
Caenis diminuta				64	6	70	14	28.1
Eurylophella temporalis	2	10	9	10	17	48	9.6	5.3
Hexagenia limbata	1		1		3	5	1	1.2
Leptophlebia intermedia	22	9	8	203	166	408	81.6	95.0
Stenonema (s.str.) femoratum	3	4	3			10	2	1.9
ODONATA	9	1	1	22	22	55	11	10.6
Aeshna umbrosa					1	1	0.2	0.4
Boyeria grafiana		1				1	0.2	0.4
Celithemia eponica				1		1	0.2	0.4
Enallagma hageni	2			6	11	19	3.8	4.7
Gomphus exilis			1	15	1	17	3.4	6.5
Ischnura verticalis	3				1	4	0.8	1.3
Leucorrhinia hudsonica					2	2	0.4	0.9
Libellula incesta	3					3	0.6	1.3
Libellula julia	1				4	5	1	1.7
Somatochlora williamsoni					2	2	0.4	0.9
HEMIPTERA				3		3	0.6	1.3
Notonecta undulata				3		3	0.6	1.3
MEGALOPTERA	3				22	25	5	9.6
Sialis sp.	3				22	25	5	9.6
TRICHOPTERA	7	38	4	28	13	90	18	14.5
Agarodes cf. distinctus				1		1	0.2	0.4
Banksiola smithi				1		1	0.2	0.4
Banksiola crotchi	4			1		5	1	1.7
Molanna ulmerina-uniophila	1			3		4	0.8	1.3
Mystacides sepulchralis		1	3	1		5	1	1.2
Nectopsyche sp.1				1		1	0.2	0.4
Nectopsyche sp.3 nr. pavida				1		1	0.2	0.4
Nyctiophylax affinis	1	1				2	0.4	0.5
Oecetis sp.2		1		2	6	9	1.8	2.5
Polycentropus sp.2		1		7		8	1.6	3.0
Pycnopsyche sp(p)	1	34	1	9	6	51	10.2	13.7
Triaenodes sp.1				1		1	0.2	0.4
Triaenodes sp.2					1	1	0.2	0.4
LEPIDOPTERA				3		3	0.6	1.3
Eoparargyractis sp.				3		3	0.6	1.3
COLEOPTERA	1		20	4		25	5	8.5
Dineutus nigrior	1			1		2	0.4	0.5
Hydroporus (Neoporus) undulatus				3		3	0.6	1.3
Stenelmis crenata			20			20	4	8.9
DIPTERA	128	52	195	284	213	872	174.4	88.1
DIPTERA:Ceratopogonidae	2		21	55	2	80	16	23.4
Bezzia sp.1			5	17	1	23	4.6	7.2
Bezzia sp.2/2A				20	1	21	4.2	8.8
Bezzia sp.3			1	3		4	0.8	1.3
Bezzia sp.4	2					2	0.4	0.9
Dasyhelea sp.1				1		1	0.2	0.4
Probezzia sp.1			12	14		26	5.2	7.2
Probezzia sp.2			1			1	0.2	0.4
Probezzia sp.3			2			2	0.4	0.9
DIPTERA:Chironomidae	126	51	174	229	210	790	158	71.5
Subfam.-Podonominae			1			1	0.2	0.4
Parochlus kiefferi			1			1	0.2	0.4
Subfam.-Tanypodinae	11	8	15	60	57	151	30.2	26.0
Ablabesmyia (s.str.) spp.	1	5	10	13	11	40	8	4.9
Clinotanypus pinguis	3				2	5	1	1.4
Conchapelopia sp.	2	1	2	10	1	16	3.2	3.8
Djalmabatista pulcher		1				1	0.2	0.4
Larsia canadensis		1				1	0.2	0.4
Procladius (s.lat.) spp.	5		2	37	43	87	17.4	20.8
Zavrelimyia sp.			1			1	0.2	0.4

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
Subfam.-Prodiamesinae		7	8	3		18	3.6	3.8
Monodiamesa nr. bathyphila		7	8	3		18	3.6	3.8
Subfam.-Orthocladiinae	2	5	1	22	24	54	10.8	11.3
Heterotrissocladius hirtapex		1		2	1	4	0.8	0.8
Parametriocnemus lundbecki				4	7	11	2.2	3.2
Psectrocladius (Mono.) cf. calcaratus					1	1	0.2	0.4
Psectrocladius (s.str.) litofilus	1	4		3	8	16	3.2	3.1
Psectrocladius (s.str.) simulans	1			3	2	6	1.2	1.3
Pseudosmittia sp.1				1		1	0.2	0.4
Stackelbergina n.sp.				7	1	8	1.6	3.0
Zalutschia obsepta			1	2	4	7	1.4	1.7
Subfam.-Chironominae	113	31	149	144	129	566	113.2	48.1
Tribe-Chironomini	61	31	149	131	122	494	98.8	50.3
Chironomus (s.str.)spp.	2					2	0.4	0.9
Cryptochironomus conus		2	1	3		6	1.2	1.3
Cryptochironomus spp.				2		2	0.4	0.9
Dicrotendipes leucoscelis				1		1	0.2	0.4
Dicrotendipes modestus					2	2	0.4	0.9
Dicrotendipes tritomus	6		1	4	12	23	4.6	4.8
Endochironomus nigricans	3			4		7	1.4	1.9
Glyptotendipes sp.1 gr."A"			1	1		2	0.4	0.5
Microtendipes pedellus	30		7	34	89	160	32	35.0
Nilothauma babiyi					1	1	0.2	0.4
Pagastiella ostansa	1					1	0.2	0.4
Paratendipes cf. nudisquama				33	9	42	8.4	14.3
Polypedilum (Pentapedilum) sordens			2		1	3	0.6	0.9
Polypedilum (s.lat.) sp.3				7		7	1.4	3.1
Polypedilum (Tripodura) simulans	1					1	0.2	0.4
Polypedilum (Tripodura) sp.1			18			18	3.6	8.0
Pseudochironomus articaudus				2		2	0.4	0.9
Pseudochironomus spp.	3		2	40	8	53	10.6	16.7
Stenochironomus hilaris			1			1	0.2	0.4
Stictochironomus sp.1/3		27	114			141	28.2	49.4
Tribelos jucundum	15	2	2			19	3.8	6.3
Tribe-Tanytarsini	52			13	7	72	14.4	21.7
Cladotanytarsus spp.				3	1	4	0.8	1.3
Paratanytarsus spp.				4	6	10	2	2.8
Tanytarsus/Micropsectra spp.	52			6		58	11.6	22.7
DIPTERA:Tipulidae					1	1	0.2	0.4
Erioptera sp.					1	1	0.2	0.4
DIPTERA:Misc.		1				1	0.2	0.4
Chaoboridae:Chaoborus (Sayomyia) punctipennis		1				1	0.2	0.4
GASTROPODA	1		1			2	0.4	0.5
Ferrissia fragilis	1		1			2	0.4	0.5
PELECYPODA	4	7	10	59	5	85	17	23.6
Pisidium casertanum	4	6	6	12	2	30	6	3.7
Pisidium ferrugineum				4		4	0.8	1.8
Pisidium nitidum			4	43	3	50	10	18.5
Pisidium subtruncatum		1				1	0.2	0.4

CRADLE LAKE OCT 26 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
OLIGOCHAETA	8	3	8		2	21	4.2	3.6
Enchytraeidae	1				1	2	0.4	0.5
Lumbriculus variegatus	7	3	8		1	19	3.8	3.6
HIRUDINEA		1	1	1	2	5	1.0	0.7
Oloiobdella elongata				1		1	0.2	0.4
Nephelopsis obscura		1	1		2	4	0.8	0.8
AMPHIPODA	315	19	194	25	502	1055	211.0	204.5
Crangonyx laurentianus	5	14	5	2		26	5.2	5.4
Hyalella azteca	310	5	189	23	502	1029	205.8	207.7
DECAPODA	1				1	2	0.4	0.5
Cambarus bartoni	1				1	2	0.4	0.5
EPHEMEROPTERA	35	84	84	16	136	355	71.0	47.1
Caenis diminuta		1		11	14	26	5.2	6.8
Eurylophella temporalis	3	5	70	1		79	15.8	30.4
Leptophlebia intermedia	31	78	12	3	122	246	49.2	49.9
Stenacron interpunctatum	1					1	0.2	0.4
Stenonema (s.str.) femoratum			2	1		3	0.6	0.9
ODONATA	2	2	2	7	13	26	5.2	4.9
Aeshna eremita					1	1	0.2	0.4
Aeshna umbrosa		1	1			2	0.4	0.5
Cordulia shurtleffi		1				1	0.2	0.4
Enallagma hageni					7	7	1.4	3.1
Hagenius brevistylus			1			1	0.2	0.4
Gomphus exilis				2		2	0.4	0.9
Ischnura verticalis					1	1	0.2	0.4
Leucorrhinia hudsonica					4	4	0.8	1.8
Libellula julia	2			5		7	1.4	2.2
HEMIPTERA	1	1		2		4	0.8	0.8
Notonecta undulata				1		1	0.2	0.4
Ranatra fusca		1				1	0.2	0.4
Sigara (Arcto.) penniensis	1			1		2	0.4	0.5
TRICHOPTERA	1	10	13	7	5	36	7.2	4.6
Banksiola crotchi		2				2	0.4	0.9
Hydroptila sp.1					1	1	0.2	0.4
Lype diversa	1		1	1		3	0.6	0.5
Molanna ulmerina-uniophila			1			1	0.2	0.4
Mystacidea sepulchralis			1			1	0.2	0.4
Nectopsyche sp.1					1	1	0.2	0.4
Nyctiophylax affinis			4			4	0.8	1.8
Oecetis sp.1		2		1	2	5	1.0	1.0
Oecetis sp.2		1				1	0.2	0.4
Oxyethira sp.1					1	1	0.2	0.4
Platycentropus sp.				1		1	0.2	0.4
Polycentropus sp.2		1	1	1		3	0.6	0.5
Ptilostomis cf. ocellifera			2	2		4	0.8	1.1
Pycnopsyche sp(p)		2	3			5	1.0	1.4
Triaenodes sp.1		2		1		3	0.6	0.9
LEPIDOPTERA					2	2	0.4	0.9
Eoparargyractic sp.					2	2	0.4	0.9
COLEOPTERA		1	6	1	1	9	1.8	2.4
Hydroporus (Neoporus) undulatus		1	6	1	1	9	1.8	2.4

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	83	128	275	834	326	1646	329.2	299.5
DIPTERA:Ceratopogonidae		8	7	1	3	19	3.8	3.6
Bezzia sp.1		1				1	0.2	0.4
Bezzia sp.1A		1				1	0.2	0.4
Bezzia sp.2/2A		2	1			3	0.6	0.9
Bezzia sp.3		3			2	5	1.0	1.4
Palpomyia sp.1 tibialis gr.		1				1	0.2	0.4
Palpomyia sp.2				1		1	0.2	0.4
Probezzia sp.1			2			2	0.4	0.9
Probezzia sp.2			4		1	5	1.0	1.7
DIPTERA:Chironomidae	83	120	268	833	323	1627	325.4	300.8
Subfam.-Tanypodinae	18	27	43	114	20	222	44.4	40.1
Ablabesmyia (s.str.) spp.	9	18	20	17	6	70	14.0	6.1
Clinotanypus pinguis				4	1	5	1.0	1.7
Conchapelopia sp.					1	1	0.2	0.4
Procladius (s.lat.) spp.	9	8	13	92	7	129	25.8	37.1
Zavrelimyia sp.		1	10	1	5	17	3.4	4.2
Subfam.-Prodiamesinae			1			1	0.2	0.4
Monodiamesa nr. bathyphila			1			1	0.2	0.4
Subfam.–Orthocladiinae	35	28	32	4	41	140	28.0	14.2
Heterotrissocladius hirtapex					4	4	0.8	1.8
Parakiefferiella sp.1 (ELA)					1	1	0.2	0.4
Psectrocladius (Meso.) sp.					1	1	0.2	0.4
Psectrocladius (s.str.) litofilus	25	27	31	4	25	112	22.4	10.6
Psectrocladius (s.str.) simulans			1			1	0.2	0.4
Stackelbergina n.sp.	10	1			10	21	4.2	5.3
Subfam.–Chironominae	30	65	192	715	262	1264	252.8	274.9
Tribe–Chironomini	25	53	180	559	65	882	176.4	221.9
Chironomus (s.str.) spp.		3		3		6	1.2	1.6
Cladopelma sp.				1		1	0.2	0.4
Cryptochironomus conus			1		2	3	0.6	0.9
Demicryptochironomus (Irmakia) cuneatus			2			2	0.4	0.9
Dicrotendipes leucoscelis		4				4	0.8	1.8
Dicrotendipes modestus	3					3	0.6	1.3
Dicrotendipes tritomus	1	8	4	9	36	58	11.6	14.0
Endochironomus nigricans		3				3	0.6	1.3
Glyptotendipes sp. 1 gr."A"		3	1	1		5	1.0	1.2
Microtendipes pedellus	5	3	11	31	15	65	13.0	11.1
Pagastiella ostansa				1		1	0.2	0.4
Paratendipes albimanus		6				6	1.2	2.7
Paratendipes cf. nudisquama					5	5	1.0	2.2
Polypedilum (Pentapedilum) sordens				1		1	0.2	0.4
Polypedilum (Tripodura) simulans		2		42	1	45	9.0	18.5
Polypedilum (Tripodura) sp.1					1	1	0.2	0.4
Pseudochironomus articaudus			1		1	2	0.4	0.5
Stenochironomus hilaris	1	1				2	0.4	0.5
Stictochironomus sp.1/3			73		2	75	15.0	32.4
Tribelos jucundum	15	16	86	470	2	589	117.8	199.6
Zavreliella marmorata		4	1			5	1.0	1.7
Tribe-Tanytarsini	5	12	12	156	197	382	76.4	92.6
Cladotanytarsus spp.		1	1	1	142	145	29.0	63.2
Paratanytarsus spp.			1			1	0.2	0.4
Tanytarsus/Micropsectra spp.	5	11	10	155	55	236	47.2	63.6
GASTROPODA			2		1	3	0.6	0.9
Perrissia fragilis			2		1	3	0.6	0.9
PELECYPODA	1	2	9	13	1	26	5.2	5.5
Pisidium casertanum	1	2	1	13		17	3.4	5.4
Pisidium nitidum			8		1	9	1.8	3.5

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
TURBELLARIA	1					1	0.2	0.4
Dugesia tigrina	1					1	0.2	0.4
NEMATODA		1		1		2	0.4	0.5
Mermithidae		1		1		2	0.4	0.5
OLIGOCHAETA	13	6	4			23	4.6	5.4
Enchytraeidae	3	5	4			12	2.4	2.3
Ilyodrilus templetoni	4					4	0.8	1.8
Lumbriculus variegatus	3	1				4	0.8	1.3
Tubificidae + hairs	3					3	0.6	1.3
HIRUDINEA		1	6	1		8	1.6	2.5
Erpobdella punctata		1	1	1		3	0.6	0.5
Gloiobdella elongata			2			2	0.4	0.9
Helobdella stagnalis			3			3	0.6	1.3
AMPHIPODA	870	239	366	78	258	1811	362.2	301.9
Crangonyx laurentianus	3	7	1	8	2	21	4.2	3.1
Hyalella azteca	867	232	365	70	256	1790	358.0	303.5
HYDRACARINA			1			1	0.2	0.4
Limnesia undulata			1			1	0.2	0.4
EPHEMEROPTERA	112	347	191	104	51	805	161.0	115.4
Caenis diminuta	13	130	161	4	30	338	67.6	72.6
Eurylopella lutulenta				1		1	0.2	0.4
Eurylophella temporalis	22	38	7	1	3	71	14.2	15.6
Hexagenia limbata,		1			1	2	0.4	0.5
Leptophlebia intermedia	58	149	23	80	15	325	65.0	53.8
Stenacron interpunctatum	13	15		10		38	7.6	7.2
Stenonema (s.str.) femoratum	6	14		8	2	30	6.0	5.5
ODONATA	115	62	98	22	27	324	64.8	41.5
Aeshna umbrosa			3			3	0.6	1.3
Basiaeschna janata	3	1	3		2	9	1.8	1.3
Cordulia shurtleffi		3				3	0.6	1.3
Didymops transversa			1			1	0.2	0.4
Dromogomphus spinosus		1				1	0.2	0.4
Enallagma exsulans	38	14	1		2	55	11.0	16.1
Enallagma hageni			5			5	1.0	2.2
Epitheca cynosura	4	12	7	1	8	32	6.4	4.2
Hagenius brevistylus	1	4				5	1.0	1.7
Gomphus exilis	55	19	46	20	5	145	29.0	20.7
Ischnura verticalis	14	3	18		8	43	8.6	7.5
Leucorrhinia hudsonica		3				3	0.6	1.3
Libellula incesta		1	6		2	9	1.8	2.5
Libellula julia		1	8	1		10	2.0	3.4
HEMIPTERA			1			1	0.2	0.4
Notonecta undulata			1			1	0.2	0.4
MEGALOPTERA	1	6				7	1.4	2.6
Chauliodes sp.	1					1	0.2	0.4
Sialis sp.		6				6	1.2	2.7
TRICHOPTERA	28	18	26	7	63	142	28.4	21.0
Agarodes cf. distinctus	4	1		1		6	1.2	1.6
Agrypnia straminea			1			1	0.2	0.4
Hydroptila sp.1					1	1	0.2	0.4
Mystacides sepulchralis	4	2				6	1.2	1.8
Nectopsyche sp.1		3	3		25	31	6.2	10.6
Nectopsyche sp.3 nr. pavida	6	6	5		19	36	7.2	7.0
Nyctiophylax affinis	2		1	1		4	0.8	0.8
Oecetis sp.1	1	5	9	1	9	25	5.0	4.0
Oecetis sp.2			2			2	0.4	0.9
Oxyethira sp.2	1				6	7	1.4	2.6
Polycentropus sp.1			2			2	0.4	0.9
Polycentropus sp.2	2		1			3	0.6	0.9
Pycnopsyche sp(p)	8	1	1	4		14	2.8	3.3
Triaenodes sp.2			1		3	4	0.8	1.3

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
COLEOPTERA	52	50	1	4	5	112	22.4	26.2
Dubiraphia minima-vitatta	45	41		1	5	92	18.4	22.6
Macronychus glabratus	2	2	1	2		7	1.4	0.9
Stenelmis crenata	5	7		1		13	2.6	3.2
DIPTERA	402	341	608	54	222	1627	325.4	206.4
DIPTERA:Ceratopogonidae	9	8	17	1		35	7.0	6.9
Bezzia sp.1		3	3			6	1.2	1.6
Bezzia sp.2/2A		2	4			6	1.2	1.8
Bezzia sp.3			1			1	0.2	0.4
Palpomyia sp.2			4			4	0.8	1.8
Probezzia sp.1	6	2				8	1.6	2.6
Probezzia sp.2			3			3	0.6	1.3
Probezzia sp.3	3	1	1	1		6	1.2	1.1
Probezzia sp.4			1			1	0.2	0.4
DIPTERA:Chironomidae	393	333	591	53	222	1592	318.4	199.9
Subfam.-Podonominae		1				1	0.2	0.4
Parochlus kiefferi		1				1	0.2	0.4
Subfam.-Tanypodinae	178	113	346	28	64	729	145.8	125.3
Ablabesmyia (s.str.) spp.	5	17	6	9	17	54	10.8	5.8
Clinotanypus pinguis			5			5	1.0	2.2
Conchapelopia sp.	12	3	24	2	6	47	9.4	9.0
Larsia canadensis	5	8		6		19	3.8	3.6
Natarsia baltimoreus					1	1	0.2	0.4
Procladius (s.lat.) spp.	155	85	311	10	40	601	120.2	119.8
Thienemannimyia norena	1			1		2	0.4	0.5
Subfam.-Orthocladiinae	55	122	55		4	236	47.2	49.5
Parakiefferiella sp.2 (ELA)	4	19	2			25	5.0	8.0
Psectrocladius (Mono.) cf. calcaratus	16	67	49		1	133	26.6	30.0
Psectrocladius (s.str.) litofilus	1					1	0.2	0.4
Psectrocladius (s.str.) simulans	2					2	0.4	0.9
Zalutschia obsepta	32	36	4		3	75	15.0	17.5
Subfam.-Chironominae	160	97	190	25	154	626	125.2	65.3
Tribe-Chironomini	63	56	80	22	130	351	70.2	39.5
Chironomus (s.str.) spp.	1		32	3	51	87	17.4	23.0
Cryptochironomus conus	3					3	0.6	1.3
Dicrotendipes leucoscelis	4	2	1		1	8	1.6	1.5
Dicrotendipes modestus	5	7	4	2	5	23	4.6	1.8
Dicrotendipes tritomus	21	4	8	1	11	45	9.0	7.7
Endochironomus nigricans	8	30	2	8	2	50	10.0	11.6
Glyptotendipes sp.1 gr."A"	1		3			4	0.8	1.3
Microtendipes pedellus	3	4	2	1	5	15	3.0	1.6
Pagastiella ostansa		1			2	3	0.6	0.9
Paratendipes albimanus				1		1	0.2	0.4
Paratendipes cf. nudisquama	1				1	2	0.4	0.5
Polypedilum (Pentapedilum) sordens	3	1			1	5	1.0	1.2
Polypedilum (Tripodura) simulans	1		5	1	5	12	2.4	2.4
Pseudochironomus articaudus	1					1	0.2	0.4
Pseudochironomus spp.			4		1	5	1.0	1.7
Stenochironomus hilaris	1	3	2	2		8	1.6	1.1
Stictochironomus sp.1/3	1					1	0.2	0.4
Tribelos jucundum	7	4	8	3	5	27	5.4	2.1
Zavreliella marmorata	2		9		40	51	10.2	17.1
Tribe-Tanytarsini	97	41	110	3	24	275	77.6	46.5
Cladotanytarsus spp.	87	38	2	3		130	26.0	37.6
Paratanytarsus spp.	3				1	4	0.8	1.3
Tanytarsus/Micropsectra spp.	7	3	108		23	141	28.2	45.5
GASTROPODA	25			1	21	47	9.4	12.5
Amnicola limosa	21				21	42	8.4	11.5
Ferrissia fragilis	2			1		3	0.6	0.9
Menetus (Micro.) dilatatus	2					2	0.4	0.9
PELECYPODA	1			1	2	4	0.8	0.8
Pisidium adamsi					2	2	0.4	0.9
Pisidium casertanum	1			1		2	0.4	0.5

DELANO LAKE OCT 26 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA	1					1	0.2	0.4
Anatonchus sp.	1					1	0.2	0.4
OLIGOCHAETA	3		2		3	8	1.6	1.5
Enchytraeidae	1		1			2	0.4	0.5
Lumbriculus variegatus			1		3	4	0.8	1.3
Tubificidae + hairs	2					2	0.4	0.9
HIRUDINEA	1			2		3	0.6	0.9
Helobdella stagnalis				2		2	0.4	0.9
Macrobdella decora	1					1	0.2	0.4
AMPHIPODA	303	267	43	13	57	683	136.6	137.0
Crangonyx laurentianus	5	2	12	4	2	25	5.0	4.1
Hyalella azteca	298	265	31	9	55	658	131.6	138.3
EPHEMEROPTERA	157	246	163	145	57	768	153.6	67.2
Caenis diminuta	5	9	97	70	1	182	36.4	44.1
Eurylophella temporalis	4	5	7	19	8	43	8.6	6.0
Leptophlebia intermedia	136	227	58	54	45	520	104.0	77.9
Stenacron interpunctatum	3				1	4	0.8	1.3
Stenonema (s.str.) femoratum	9	5	1	2	2	19	3.8	3.3
ODONATA	28	53	15	14	26	136	27.2	15.7
Aeshna eremita	1					1	0.2	0.4
Aeshna umbrosa					2	2	0.4	0.9
Basiaeschna janata		1				1	0.2	0.4
Boyeria grafiana	2	1				3	0.6	0.9
Cordulia shurtleffi	5	3	10	2	3	23	4.6	3.2
Enallagma exsulans		4			2	6	1.2	1.8
Enallagma hageni	1	7	3	3		14	2.8	2.7
Epitheca cynosura	1	8			1	10	2.0	3.4
Hagenius brevistylus		1				1	0.2	0.4
Gompbus exilis	9	13		1	3	26	5.2	5.6
Ischnura verticalis	7	7	2	8	1	25	5.0	3.2
Libellula julia		1			3	4	0.8	1.3
Somatochlora williamsoni	2	7			11	20	4.0	4.8
HEMIPTERA		1				1	0.2	0.4
Notonecta undulata		1				1	0.2	0.4
MEGALOPTERA				1		1	0.2	0.4
Sialis sp.				1		1	0.2	0.4
TRICHOPTERA	1	17	4	9	7	38	7.6	6.1
Agarodes cf. distinctus	1	1				2	0.4	0.5
Agrypnia straminea			1			1	0.2	0.4
Ceraclea alces			1			1	0.2	0.4
Hydroptila sp.1				2		2	0.4	0.9
Lepidostoma sp.		4			2	6	1.2	1.8
Lype diversa					1	1	0.2	0.4
Mystacides sepulchralis		3		1		4	0.8	1.3
Nectopsyche sp.3 nr. pavida				1		1	0.2	0.4
Oecetis sp.1				2		2	0.4	0.9
Oecetis sp.6				1		1	0.2	0.4
Platycentropus sp.					1	1	0.2	0.4
Polycentropus sp.2		9	2	2	2	15	3.0	3.5
Pycnopsyche sp(p)					1	1	0.2	0.4
COLEOPTERA	5	4		9		18	3.6	3.8
Dubiraphia minima-vitatta				9		9	1.8	4.0
Gyrinus frosti		1				1	0.2	0.4
Stenelmis crenata	5	3				8	1.6	2.3

DELANO LAKE OCT 26 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	59	88	125	195	32	499	99.8	63.4
DIPTERA:Ceratopogonidae	1	1	7	4	1	14	2.8	2.7
Bezzia sp.1				1		1	0.2	0.4
Bezzia sp.2/2A			1	1	1	3	0.6	0.5
Bezzia sp.3	1			2		3	0.6	0.9
Dasybelea sp.1 (pale head)			1			1	0.2	0.4
Monohelea sp.			2			2	0.4	0.9
Probezzia sp.4		1	3			4	0.8	1.3
DIPTERA:Chironomidae	58	87	118	191	31	485	97.0	61.8
Subfam.–Tanypodinae	28	44	64	74	8	218	43.6	26.7
Ablabesmyia (s.str.) spp.		2	1	13	2	18	3.6	5.3
Clinotanypus pinguis	1					1	0.2	0.4
Conchapelopia sp.	13	15	9	3	4	44	8.8	5.3
Djalmabatista pulcher	3					3	0.6	1.3
Labrundinia neopilosella				1		1	0.2	0.4
Larsia canadensis	1	5	1			7	1.4	2.1
Procladius (s.lat.) spp.	9	22	46	48	2	127	25.4	21.0
Zavrelimyia sp.	1		7	9		17	3.4	4.3
Subfam.–Orthocladiinae	4	8	8	6		26	5.2	3.3
Cricotopus (Iso.) sp.2 sylvestris gr.				1		1	0.2	0.4
Heterotrissocladius changi	1					1	0.2	0.4
Parametriocnemus lundbecki				1		1	0.2	0.4
Psectrocladius (s.str.) litofilus	2	6	6	1		15	3.0	2.8
Psectrocladius (s.str.) simulans	1		1	3		5	1.0	1.2
Stackelbergina n.sp.			1			1	0.2	0.4
Zalutschia obsepta		2				2	0.4	0.9
Subfam.–Chironominae	26	35	46	111	23	241	48.2	36.2
Tribe–Chironomini	20	25	40	74	16	175	35.0	23.6
Chironomus (s.str.) spp.			3	18	2	23	4.6	7.6
Cladopelma sp.				1		1	0.2	0.4
Cryptochironomus conus	1			2		3	0.6	0.9
Dicrotendipes leucoscelis			3			3	0.6	1.3
Dicrotendipes modestus	1	1	7	3		12	2.4	2.8
Dicrotendipes tritomus	1	1	1	7		10	2.0	2.8
Endochironomus nigricans		6		2		8	1.6	2.6
Glyptotendipes sp. 1 gr."A"				1		1	0.2	0.4
Lauterborniella agrayloides			1			1	0.2	0.4
Microtendipes pedellus	4	10	17	8	3	42	8.4	5.6
Pagastiella ostansa				1		1	0.2	0.4
Parachironomus abortivus					1	1	0.2	0.4
Phaenopsectra flavipes		1		2		3	0.6	0.9
Polypedilum (Pentapedilum) sordens				1	1	2	0.4	0.5
Polypedilum (Tripodura) simulans			1	3		4	0.8	1.3
Pseudochironomus spp.	1		1			2	0.4	0.5
Stenochironomus hilaris	1	1				2	0.4	0.5
Stictochironomus sp.1/3	3					3	0.6	1.3
Tribelos jucundum	8	5	5	17	9	44	8.8	4.9
Xenochironomus xenolabis			1			1	0.2	0.4
Zavreliella marmorata				8		8	1.6	3.6
Tribe–Tanytarsini	6	10	6	37	7	66	13.2	13.4
Cladotanytarsus spp.	1					1	0.2	0.4
Paratanytarsus spp.	1			2		3	0.6	0.9
Tanytarsus/Micropsectra spp.	4	10	6	35	7	62	12.4	12.8
GASTROPODA		1			1	2	0.4	0.5
Ferrissia fragilis		1				1	0.2	0.4
Menetus (Micro.) dilatatus ?					1	1	0.2	0.4
PELECYPODA	5	12	12	2		31	6.2	5.6
Pisidium casertanum	5	8	7	2		22	4.4	3.4
Pisidium nitidum		4	4			8	1.6	2.2
Pisidium subtruncatum			1			1	0.2	0.4

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
TURBELLARIA					1	1	0.2	0.4
Dugesia tigrina					1	1	0.2	0.4
OLIGOCHAETA	7	30	8	5	14	64	12.8	10.2
Enchytraeidae	3	7	3		3	16	3.2	2.5
Lumbriculus variegatus	4	7	3	2	2	18	3.6	2.1
Nais simplex		1				1	0.2	0.4
Slavania appendiculata				1		1	0.2	0.4
Stylaria lacustris		9	1	1	7	18	3.6	4.1
Tubificidae + hairs		6	1	1	2	10	2.0	2.3
HIRUDINEA	1	1				2	0.4	0.5
Desserobdella picta	1					1	0.2	0.4
Erpobdella punctata		1				1	0.2	0.4
AMPHIPODA	69	513	1045	1365	625	3617	723.4	499.3
Crangonyx laurentianus	16	21	10	1	16	64	12.8	7.7
Hyalella azteca	53	492	1035	1364	609	3553	710.6	505.6
HYDRACARINA	5	3	9	8	16	41	8.2	5.0
Arrenurus (Mega.) apetiolatus	1			2	2	5	1.3	1.0
Arrenurus (Mega.) bergei		1				1	0.2	0.4
Arrenurus (Mega.) megalurus		1				1	0.2	0.4
Hydrodroma americanus				1	1	2	0.4	0.5
Limnesia undulata				1		1	0.2	0.4
Limnochares americana				2	2	4	0.8	1.1
Pseudohydryphantes orbicularis				1	1	2	0.4	0.5
Unionicola crassipes laurentiana	4	1	9	1	10	25	5.0	4.3
EPHEMEROPTERA	82	656	408	165	361	1672	334.4	224.7
Caenis diminuta	8	22	7		22	59	11.8	9.8
Eurylophella temporalis	6	72	57	49	9	193	38.6	29.6
Leptophlebia intermedia	68	561	340	116	330	1415	283.0	198.0
Stenacron interpunctatum			2			2	0.4	0.9
Stenonema (s.str.) femoratum		1	2			3	0.6	0.9
ODONATA	12	83	58	76	85	314	62.8	30.3
Aeshna canadensis		1				1	0.2	0.4
Aeshna umbrosa		1		1		2	0.4	0.5
Argia violacea		4	5			9	1.8	2.5
Basiaeschna janata		1				1	0.2	0.4
Celithemis eponina	1	28	4	3	14	50	10.0	11.2
Cordulia shurtleffi	1	3	7	4	6	21	4.2	2.4
Enallagma exsulans		2				2	0.4	0.9
Enallagma hageni	4	7	2	13	26	52	10.4	9.7
Epitheca cynosura		1	4	3		8	1.6	1.8
Gomphus exilis		14	12	15	2	43	8.6	7.1
Ischnura verticalis	2	17	7	17	8	51	10.2	6.6
Lestes vigilax	1	1	1	2	1	6	1.2	0.4
Leucorrhinia frigida	2		10	6	12	30	6.0	5.1
Leucorrhinia hudsonica			1	4		5	1.0	1.7
Libellula incesta		2	1	1	4	8	1.6	1.5
Libellula julia	1	1	4	7	12	25	5.0	4.6
MEGALOPTERA		1	1			2	0.4	0.5
Sialis sp.		1	1			2	0.4	0.5
TRICHOPTERA	31	151	88	32	104	406	81.2	50.9
Agrypnia straminea		10	3	2	2	17	3.4	3.8
Agrypnia vestita			1			1	0.2	0.4
Hydroptila sp.1	12	35	66	20	15	148	29.6	22.2
Nectopsyche sp.1	2	1			1	4	0.8	0.8
Nemotaulius hostilis			1			1	0.2	0.4
Nyctiophylax affinis		2	1			3	0.6	0.9
Oecetis sp.2	1	1				2	0.4	0.5
Oxyethira sp.1					1	1	0.2	0.4
Oxyethira sp.2		8	2	3	1	14	2.8	3.1
Polycentropus sp.1	11	57	14	5	27	114	22.8	20.7
Polycentropus sp.2	5	34		2	56	97	19.4	24.7
Ptilostomis cf. ocellifera		2				2	0.4	0.9
Pycnopsyche sp(p)		1			1	2	0.4	0.5
COLEOPTERA			1	3		4	0.8	1.3
Cyphon sp.			1			1	0.2	0.4
Dineutus nigrior				3		3	0.6	1.3

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	129	362	284	458	288	1521	304.2	120.8
DIPTERA:Ceratopogonidae	19	23	201	113	33	389	77.8	78.9
Bezzia sp.1	15	21	195	83	16	330	66.0	77.5
Bezzia sp.1A		1		1		2	0.4	0.5
Bezzia sp.2/2A	3	1	5	9	16	34	6.8	5.9
Bezzia sp.3	1		1			2	0.4	0.5
Bezzia sp.4				16		16	3.2	7.2
Bezzia sp.5				1		1	0.2	0.4
Dasyhelea sp.1 (pale head)				2	1	3	0.6	0.9
Monohelea sp.				1		1	0.2	0.4
DIPTERA:Chironomidae	109	339	83	344	254	1129	225.8	124.1
Subfam.-Tanypodinae	28	139	45	152	111	475	95.0	55.7
Ablabesmyia (s.str.) spp.	8	36	7	15	14	80	16.0	11.7
Clinotanypus pinguis			2		2	4	0.8	1.1
Conchapelopia sp.	11	44	17	19	13	104	20.8	13.3
Labrundinia neopilosella	1					1	0.2	0.4
Larsia canadensis	2	4	12	3		21	4.2	4.6
Procladius (s.lat.) spp.	6	55	7	115	82	265	53.0	47.5
Subfam.–Orthocladiinae	8	143	16	71	81	319	63.8	54.8
Corynoneura sp.1	1	1	1	1		4	0.8	0.4
Heterotrissocladius changi	1					1	0.2	0.4
Nanocladius (s.str.) nr. minimus	1		1			2	0.4	0.5
Psectrocladius (Mono.) cf.calcaratus	2	7	9	51	66	135	27.0	29.4
Psectrocladius (s.str.) litofilus	3	111	4	16	7	141	28.2	46.6
Psectrocladius (s.str.) simulans		1		3	5	9	1.8	2.2
Stackelbergina n. sp.		20	1		3	24	4.8	8.6
Zalutschia obsepta		3				3	0.6	1.3
Subfam.–Chironominae	73	57	22	121	62	335	67.0	35.7
Tribe–Chironomini	73	50	20	105	58	306	61.2	31.2
Chironomus (s.str.) spp.	2	4			7	13	2.6	3.0
Cryptochironomus conus				1	2	3	0.6	0.9
Dicrotendipes leucoscelis	1	1			4	6	1.2	1.6
Dicrotendipes modestus				10	1	11	2.2	4.4
Dicrotendipes tritomus		3	1	20	2	26	5.2	8.3
Endochironomus nigricans	1	5	1	3	1	11	2.2	1.8
Glyptotendipes sp. 1 gr."A"				1		1	0.2	0.4
Glyptotendipes sp. gr."B"	1	3		3		7	1.4	1.5
Microtendipes pedellus	12	3	2	16	12	45	9.0	6.2
Omisus ?caledonicus			1			1	0.2	0.4
Pagastiella ostansa	1		4	1	11	17	3.4	4.5
Paratendipes albimanus	4					4	0.8	1.8
Phaenopsectra flavipes	1					1	0.2	0.4
Polypedilum (s.str.) trigonum				1		1	0.2	0.4
Polypedilum (s.lat.) sp.1		23	3	26	5	57	11.4	12.1
Polypedilum (s.lat.) sp.3	9					9	1.8	4.0
Polypedilum (Tripodura) simulans	1		2	13		16	3.2	5.5
Pseudochironomus spp.	24	4		4	8	40	8.0	9.4
Stenochironomus hilaris			2			2	0.4	0.9
Stictochironomus sp.1/3				4		4	0.8	1.8
Tribelos jucundum	16		4		1	21	4.2	6.8
Zavreliella marmorata		4		2	4	10	2.0	2.0
Tribe–Tanytarsini		7	2	16	4	29	5.8	6.3
Cladotanytarsus spp.				10		10	2.0	4.5
Paratanytarsus spp.		6				6	1.2	2.7
Tanytarsus/Micropsectra spp.		1	2	6	4	13	2.6	2.4
DIPTERA:Tabanidae					1	1	0.2	0.4
Chrysops sp.					1	1	0.2	0.4
DIPTERA:Tipulidae	1					1	0.2	0.4
Erioptera sp.	1					1	0.2	0.4
DIPTERA:Misc.				1		1	0.2	0.4
Dolichopodidae				1		1	0.2	0.4
GASTROPODA	3	3	2		1	9	1.8	1.3
Perrissia fragilis ?	3	3	2		1	9	1.8	1.3
PELECYPODA	7	52	157	37	17	270	54.0	60.2
Pisidium casertanum	6	42	146	24	17	235	47.0	56.9
Pisidium ferrugineum			1	4		5	1.0	1.7
Pisidium lilljeborgi		10	3	7		20	4.0	4.4
Pisidium nitidum	1		7	2		10	2.0	2.9

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
TURBELLARIA	1	17	5	1	3	27	5.4	6.7
Dugesia tigrina	1	17	5	1	3	27	5.4	6.7
OLIGOCHAETA	19	5	18	8	11	61	12.2	6.1
Enchytraeidae	10	2	2	2	4	20	4.0	3.5
Ilyodrilus templetoni	2		1	3		6	1.2	1.3
Lumbriculus variegatus	1	3	12	3	4	23	4.6	4.3
Lumbriculidae					2	2	0.4	0.9
Tubificidae + hairs	6		3		1	10	2.0	2.5
HIRUDINEA		1		2		3	0.6	0.9
Erpobdella punctata				2		2	0.4	0.9
Gloiobdella elongata		1				1	0.2	0.4
AMPHIPODA	700	327	351	161	556	2095	419.0	210.6
Crangonyx laurentianus				5		5	1.0	2.2
Hyalella azteca	700	327	351	156	556	2090	418.0	212.1
EPHEMEROPTERA	57	54	12	159	42	324	64.8	55.6
Caenis punctata		1	1	12	4	18	3.6	4.9
Eurylophella latulenta			1			1	0.2	0.4
Eurylophella temporalis	2			11	7	20	4.0	4.8
Leptophlebia intermedia	54	25	9	125	26	239	47.8	46.1
Siphloplecton basale					1	1	0.2	0.4
Stenacron interpunctatum		7		7	3	17	3.4	3.5
Stenonema (s.str.) femoratum	1	21	1	4	1	28	5.6	8.7
ODONATA	164	31	24	30	97	346	69.2	60.8
Basiaeschna janata	1			1	1	3	0.6	0.5
Boyeria grafiana			1			1	0.2	0.4
Didymops transversa	1	1				2	0.4	0.5
Enallagma exsulans	2	1	3	2	15	23	4.6	5.9
Enallagma hageni	39	6	13	8	58	124	24.8	22.8
Epitheca cynosura	10	4		3	4	21	4.2	3.6
Hagenius brevistylus	2		1	2	1	6	1.2	0.8
Gomphus exilis	105	19	6	14	18	162	32.4	40.9
Ischnura verticalis	3					3	0.6	1.3
Libellula julia	1					1	0.2	0.4
PLECOPTERA			1			1	0.2	0.4
Isoperla marlynia			1			1	0.2	0.4
HEMIPTERA					1	1	0.2	0.4
Sigara (Pileo.) douglasensis					1	1	0.2	0.4
MEGALOPTERA	2			1		3	0.6	0.9
Sialis sp.	2			1		3	0.6	0.9
TRICHOPTERA	16	7	23	19	12	77	15.4	6.2
Agarodes cf. distinctus	5	3	2	1	1	12	2.4	1.7
Lepidostoma sp.			1	1		2	0.4	0.5
Molanna ulmerina-uniophila		1		2	3	6	1.2	1.3
Mystacides sepulchralis	2	1		2	1	6	1.2	0.8
Nectopsyche sp.1	3					3	0.6	1.3
Nyctiophylax affinis				2		2	0.4	0.9
Phylocentropus sp.	1			3		4	0.8	1.3
Polycentropus sp.1				2	5	7	1.4	2.2
Polycentropus sp.2	3	2		1	1	7	1.4	1.1
Pycnopsyche sp.	2		18	5		25	5.0	7.5
Triaenodes sp.1					1	1	0.2	0.4
Triaenodes sp.2			2			2	0.4	0.9
LEPIDOPTERA	2	2				4	0.8	1.1
Eoparargyractis sp.	2	2				4	0.8	1.1
COLEOPTERA	2	20	1	2	4	29	5.8	8.0
Dubiraphia minima-vitatta	2	3	1		1	7	1.4	1.1
Ectopria nervosa		1				1	0.2	0.4
Macronychus glabratus				1	1	2	0.4	0.5
Stenelmis crenata		16		1	2	19	3.8	6.9

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	526	48	206	92	172	1044	208.8	188.1
DIPTERA:Ceratopogonidae	14	2	16	5	22	59	11.8	8.2
Bezzia sp.1	1					1	0.2	0.4
Bezzia sp.4			2		1	3	0.6	0.9
Dasyhelea sp.1 (pale head)	4		4		2	10	2.0	2.0
Dasyhelea sp.2 (dark head)					1	1	0.2	0.4
Palpomyia sp.2				1		1	0.2	0.4
Probezzia sp.1	8	2	7	3	15	35	7.0	5.1
Probezzia sp.4	1		3	1	1	6	1.2	1.1
Stilobezzia sp.					2	2	0.4	0.9
DIPTERA:Chironomidae	511	46	190	87	150	984	196.8	184.2
Subfam.-Tanypodinae	154	34	90	66	112	456	91.2	45.5
Ablabesmyia (s.str.) spp.	2	1		4	3	10	2.0	1.6
Clinotanypus pinguis	4			1	1	6	1.2	1.6
Conchapelopia sp.	40	22	12	35	52	161	32.2	15.6
Djalmabatista pulcher	4		29	1	4	38	7.6	12.1
Larsia canadensis	78	4	11	9	20	122	24.4	30.5
Procladius (s.lat.) spp.	26	6	36	16	30	114	22.8	11.9
Thienemannimyia norena		1	2		2	5	1.0	1.0
Subfam.-Prodiamesinae	1	1	11	1	10	24	4.8	5.2
Monodiamesa nr. bathyphila	1	1	11	1	10	24	4.8	5.2
Subfam.-Orthocladiinae	45	5	10	1	8	69	13.8	17.8
Parametriocnemus lundbecki	1					1	0.2	0.4
Psectrocladius (s.str.) litofilus					1	1	0.2	0.4
Psectrocladius (s.str.) simulans	1		1		1	3	0.6	0.5
Pseudosmittia sp.1		2	2			4	0.8	1.1
Zalutschia obsepta	43	3	7	1	6	60	12.0	17.5
Subfam.-Chironominae	311	6	79	19	20	435	87.0	128.4
Tribe-Chironomini	244	5	11	19	14	293	58.6	103.8
Cryptochironomus conus					2	2	0.4	0.9
Demicryptochironomus cuneatus			1			1	0.2	0.4
Dicrotendipes leucoscelis	3		1			4	0.8	1.3
Dicrotendipes modestus	9	1				10	2.0	3.9
Dicrotendipes tritomus	26		2	2		30	6.0	11.2
Endochironomus nigricans	3	1	1	6	3	14	2.8	2.0
Glyptotendipes sp. gr."B"	3					3	0.6	1.3
Microtendipes pedellus	1	2			1	4	0.8	0.8
Nilothauma babiyi			1			1	0.2	0.4
Pagastiella ostansa	10			4	1	15	3.0	4.2
Polypedilum (Pentapedilum) sordens					2	2	0.4	0.9
Polypedilum (Pentapedilum) tritum				4		4	0.8	1.8
Pseudochironomus articaudus	2			2		4	0.8	1.1
Pseudochironomus spp.	181	1	5		2	189	37.8	80.1
Stenochironomus hilaris				1	2	3	0.6	0.9
Stictochironomus sp.1/3	4					4	0.8	1.8
Tribelos jucundum	2				1	3	0.6	0.9
Tribe-Tanytarsini	67	1	68		6	142	28.4	35.8
Cladotanytarsus sp.	7		63		6	76	15.2	26.9
Stempellina sp.			4			4	0.8	1.8
Tanytarsus/Micropsectra spp.	60	1	1			62	12.4	26.6
DIPTERA:Tipulidae	1					1	0.2	0.4
Erioptera sp.	1					1	0.2	0.4
GASTROPODA	45	18	2	5	22	92	18.4	17.1
Amnicola limosa	40	18	2	2	22	84	16.8	15.8
Perrisia fragilis?	2			3		5	1.0	1.4
Helisoma anceps	1					1	0.2	0.4
Menetus (Micro.) dilatatus ?	2					2	0.4	0.9
PELECYPODA	82	5	19	17	105	228	45.6	44.8
Musculium securis	12			3	2	17	3.4	5.0
Pisidium casertanum	60	4	19	10	60	153	30.6	27.4
Pisidium ferrugineum	1					1	0.2	0.4
Pisidium lilljeborgi		1			2	3	0.6	0.9
Pisidium nitidum	9			4	40	53	10.6	16.8

PINCHER LAKE OCT 27 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA	3					3	0.6	1.3
Anatonchus sp.	2					2	0.4	0.9
Mermithidae	1					1	0.2	0.4
OLIGOCHAETA	10	2	10	3	2	27	5.4	4.2
Enchytraeidae			2	1	1	4	0.8	0.8
Lumbriculus variegatus	10	2	7	2		21	4.2	4.1
Stylaria lacustris					1	1	0.2	0.4
Tubificidae + hairs			1			1	0.2	0.4
HIRUDINEA	1	2	1			4	0.8	0.8
Helobdella stagnalis		1				1	0.2	0.4
Nephelopsis obscura	1	1	1			3	0.6	0.5
AMPHIPODA	90	23	27	8	300	448	89.6	121.7
Crangonyx laurentianus	15	22	16	8	18	79	15.8	5.1
Hyalella azteca	75	1	11		282	369	73.8	120.5
EPHEMEROPTERA	97	52	126	53	123	451	90.2	36.2
Eurylophella temporalis	4		2	5		11	2.2	2.3
Leptophlebia intermedia	93	52	124	48	123	440	88.0	36.9
ODONATA	4	4	8	9	6	31	6.2	2.3
Aeshna eremita		1			1	2	0.4	0.5
Cordulia shurtleffi	1	1				2	0.4	0.5
Gomphus exilis				1	3	4	0.8	1.3
Enallagma cyathigerum	1		3	1		5	1.0	1.2
Leucorrhinia hudsonica	1		4	7	1	13	2.6	2.9
Libellula julia	1	2	1		1	5	1.0	0.7
HEMIPTERA			2	1	3	6	1.2	1.3
Buenoa macrotibialis			1			1	0.2	0.4
Notonecta insulata					3	3	0.6	1.3
Sigara (Phaeo.) macropala			1	1		2	0.4	0.5
MEGALOPTERA					1	1	0.2	0.4
Sialis sp.					1	1	0.2	0.4
TRICHOPTERA	3	2	27	30	9	71	14.2	13.4
Agrypnia straminea	1			2		3	0.6	0.9
Banksiola smithi	1		17	20		38	7.6	10.0
Banksiola crotchi		1				1	0.2	0.4
Molanna ulmerina-uniophila					1	1	0.2	0.4
Oecetis sp.1			2	2		4	0.8	1.1
Platycentropus sp.					2	2	0.4	0.9
Polycentropus sp.1			1	4		5	1.0	1.7
Polycentropus sp.2	1		2		5	8	1.6	2.1
Ptilostomis cf. ocellifera			2	2	1	5	1.0	1.0
Pycnopsyche sp.		1	3			4	0.8	1.3
COLEOPTERA	1		1	6		8	1.6	2.5
Coptotomus sp.				1		1	0.2	0.4
Dineutus nigrior	1		1	5		7	1.4	2.1

PINCHER LAKE OCT 27 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	478	157	395	467	155	1652	330.4	162.4
DIPTERA:Ceratopogonidae	1	4	20	17	15	57	11.4	8.4
Bezzia sp.1		1	11	5	2	19	3.8	4.4
Bezzia sp.2/2A	1	2	3	9		15	3.0	3.5
Bezzia sp.3		1	5	2		8	1.6	2.1
Bezzia sp.4			1			1	0.2	0.4
Monohelea sp.2				1		1	0.2	0.4
Probezzia sp.1					13	13	2.6	5.8
DIPTERA:Chironomidae	477	153	374	450	140	1594	318.8	161.8
Subfam.-Tanypodinae	117	58	81	171	18	445	89.0	58.3
Ablabesmyia (s.str.) spp.	4	1	14	18	5	42	8.4	7.2
Clinotanypus pinguis				1		1	0.2	0.4
Conchapelopia sp.	2	2	18	3	4	29	5.8	6.9
Procladius (s.lat.) spp.	110	54	40	144	9	357	71.4	54.6
Zavrelimyia sp.	1	1	9	5		16	3.2	3.8
Subfam.-Orthocladiinae	12	10	65	96	34	217	43.4	36.8
Psectrocladius (Mono.) cf. calcaratus			8	16		24	4.8	7.2
Psectrocladius (s.str.) litofilus	1	9	8	64	7	89	17.8	26.0
Psectrocladius (s.str.) simulans	1					1	0.2	0.4
Stackelbergina n.sp.	7		38	16	9	70	14.0	14.6
Zalutschia obsepta	3	1	11		18	33	6.6	7.7
Subfam.-Chironominae	348	85	228	183	88	932	186.4	109.3
Tribe-Chironomini	310	43	142	122	81	698	139.6	102.6
Chironomus (s.str.) spp.	32	3	31	8		74	14.8	15.5
Cladopelma sp.				3		3	0.6	1.3
Cryptochironomus conus	2	1	10	7	5	25	5.0	3.7
Dicrotendipes leucoscelis	5	3	16	6		30	6.0	6.0
Dicrotendipes modestus	9	16	17	43	5	90	18.0	14.8
Dicrotendipes tritomus	4		3		7	14	2.8	2.9
Microtendipes pedellus	38	6	24	16	9	93	18.6	12.9
Pagastiella ostansa		2	3	7		12	2.4	2.9
Phaenopsectra flavipes					2	2	0.4	0.9
Polypedilum (s.lat.) sp.1			2			2	0.4	0.9
Polypedilum (s.lat.) sp.3			1			1	0.2	0.4
Polypedilum (Tripodura) simulans	1	4	1	6		12	2.4	2.5
Pseudochironomus spp.	18	6	3	6	4	37	7.4	6.1
Stenochironomus hilaris	1		3			4	0.8	1.3
Stictochironomus sp.1/3					46	46	9.2	20.6
Tribelos jucundum	200	2	28	20	3	253	50.6	84.3
Tribe-Tanytarsini	38	42	86	61	7	234	46.8	29.3
Cladotanytarsus spp.		18	11	7	1	37	7.4	7.4
Paratanytarsus spp.				1	1	2	0.4	0.5
Tanytarsus sp. 'Pc-brush'	2		9			11	2.2	3.9
Tanytarsus/Micropsectra spp.	36	24	66	53	5	184	36.8	23.9
DIPTERA:Tabanidae			1			1	0.2	0.4
Chrysops ?excitans			1			1	0.2	0.4
GASTROPODA	1			1		2	0.4	0.5
Ferrissia fragilis?	1			1		2	0.4	0.5
PELECYPODA	1	64		45	5	115	23.0	29.6
Pisidium casertanum	1	58		45	4	108	21.6	27.7
Pisidium lilljeborgi		4				4	0.8	1.8
Pisidium nitidum		2			1	3	0.6	0.9

PLASTIC LAKE OCT 12 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA			1			1	0.2	0.4
Mermithidae			1			1	0.2	0.4
OLIGOCHAETA	5	3	3	10	7	28	5.6	3.0
Enchytraeidae		1		4	2	7	1.4	1.7
Ilyodrilus templetoni	1					1	0.2	0.4
Lumbriculus variegatus	4	1	2	6	3	16	3.2	1.9
Lumbriculidae		1				1	0.2	0.4
Stylaria lacustris					2	2	0.4	0.9
Tubificidae + hairs			1			1	0.2	0.4
HIRUDINEA	1	1	6			8	1.6	2.5
Gloiobdella elongata			1			1	0.2	0.4
Helobdella stagnalis		1	5			6	1.2	2.2
Placobdella papillifera	1					1	0.2	0.4
AMPHIPODA	62	123		147	11	343	68.6	65.5
Crangonyx laurentianus				4		4	0.8	1.8
Hyalella azteca	62	123		143	11	339	67.8	64.3
HYDRACARINA			1		1	2	0.4	0.5
Arrenurus (A.) auricularis			1			1	0.2	0.4
Hydrodroma americanus					1	1	0.2	0.4
EPHEMEROPTERA	37	21	30	107	68	263	52.6	35.2
Eurylophella temporalis	3			1		4	0.8	1.3
Leptophlebia intermedia	33	21	30	106	68	258	51.6	35.3
Stenacron interpunctatum	1					1	0.2	0.4
ODONATA	16	22	12	47	21	118	23.6	13.7
Aeshna canadensis		1				1	0.2	0.4
Aeshna eremita	1					1	0.2	0.4
Aeshna umbrosa					1	1	0.2	0.4
Basiaeschna janata	1					1	0.2	0.4
Celithemis eponica	3	4	1		2	10	2.0	1.6
Chromagrion conditum				4		4	0.8	1.8
Enallagma hageni	1	3	2	2	5	13	2.6	1.5
Epitheca cynosura				6	1	7	1.4	2.6
Gomphus exilis	2	3	3		2	10	2.0	1.2
Ischnura verticalis	4	7	4	33	9	57	11.4	12.3
Leucorrhinia hudsonica	1		2	1		4	0.8	0.8
Libellula incesta				1		1	0.2	0.4
Libellula julia	3	4			1	8	1.6	1.8
TRICHOPTERA	24	25	16	17	31	113	22.6	6.2
Agrypnia straminea				2		2	0.4	0.9
Agrypnia vestita			2			2	0.4	0.9
Ceraclea alces		1				1	0.2	0.4
Hydroptila sp.1	1		2	1	2	6	1.2	0.8
Lype diversa					2	2	0.4	0.9
Nectopsyche sp.1					1	1	0.2	0.4
Nyctiophylax affinis				1	2	3	0.6	0.9
Oecetis sp.1	3	2	1	2	5	13	2.6	1.5
Oecetis sp.2	7	19	5	1	4	36	7.2	6.9
Oxyethira sp.1			1		2	3	0.6	0.9
Oxyethira sp.2			1	2		3	0.6	0.9
Phylocentropus sp.			2		1	3	0.6	0.9
Polycentropus sp.2	8	2		6	12	28	5.6	4.8
Pycnopsyche sp.2	5	1	2	2		10	2.0	1.9
LEPIDOPTERA					1	1	0.2	0.4
Eoparargyractis sp.					1	1	0.2	0.4
COLEOPTERA			1			1	0.2	0.4
Cyphon sp.			1			1	0.2	0.4
DIPTERA	269	451	495	370	640	2225	445.0	138.9
DIPTERA:Ceratopogonidae	8	11	18	23	10	70	14.0	6.3
Bezzia sp.1	3	3	1	2	3	12	2.4	0.9
Bezzia sp.1A	1	2	4	12	1	20	4.0	4.6
Bezzia sp.2/2A	1	5	12	8	6	32	6.4	4.0
Bezzia sp.3	1		1	1		3	0.6	0.5
Dasyhelea sp.1 (pale head)		1				1	0.2	0.4
Probezzia sp.1	1					1	0.2	0.4
Probezzia sp.2	1					1	0.2	0.4

PLASTIC LAKE OCT 12 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA:Chironomidae	260	440	475	347	629	2151	430.2	139.2
Subfam.-Tanypodinae	77	71	111	96	127	482	96.4	23.3
Ablabesmyia (s.str.) spp.	18	13	61	15	20	127	25.4	20.1
Clinotanypus pinguis	13	7	1	9	10	40	8.0	4.5
Conchapelopia sp.	26	19	15	32	43	135	27.0	11.1
Larsia canadensis			2	1	1	4	0.8	0.8
Larsia indistincta	3					3	0.6	1.3
Procladius (s.lat.) spp.	17	32	32	39	53	173	34.6	13.0
Subfam.-Orthocladiinae	53	62	41	79	146	381	76.2	41.4
Corynoneura sp.1			2			2	0.4	0.9
Psectrocladius (Mono.) cf. calcaratus	1	1	3	19	51	75	15.0	21.5
Psectrocladius (s.str.) litofilus	20	14	25	24	38	121	24.2	8.8
Psectrocladius (s.str.) simulans	4	3	5	2	2	16	3.2	1.3
Stackelbergina n.sp.	6	3	3	7	8	27	5.4	2.3
Xylotopus par	1					1	0.2	0.4
Zalutschia obsepta	21	41	3	27	47	139	27.8	17.4
Subfam.-Chironominae	130	307	323	172	356	1288	257.6	100.0
Tribe-Chironomini	114	276	232	109	154	885	177.0	74.1
Chironomus (s.str.) spp.	8	19	4	4	30	65	13.0	11.3
Cladopelma sp.					1	1	0.2	0.4
Cryptochironomous conus	6	9	27	6	2	50	10.0	9.8
Dicrotendipes leucoscelis	2					2	0.4	0.9
Dicrotendipes modestus			4	2	1	7	1.4	1.7
Dicrotendipes tritomus	10	22	95	9	9	145	29.0	37.3
Endochironomus nigricans	3	2	1	17	12	35	7.0	7.1
Glyptotendipes sp. 1 gr."A"		3	18	4	7	32	6.4	6.9
Lauterborniella agrayloides		1	6			7	1.4	2.6
Microtendipes pedellus	45	164	16	50	45	320	64.0	57.5
Nilothauma babiyi					1	1	0.2	0.4
Pagastiella ostansa		1				1	0.2	0.4
Polypedilum (Pentapedilum) sordens	2		1	1		4	0.8	0.8
Polypedilum (s.lat.) sp.1			1		2	3	0.6	0.9
Polypedilum (Tripodura) simulans	17	5	12	3	2	39	7.8	6.5
Pseudochironomus spp.	14	24	5	4	10	57	11.4	8.1
Stenochironomus hilaris		1		2	1	4	0.8	0.8
Tribelos jucundum	7	25	41	6	31	110	22.0	15.3
Zavreliella marmorata			1	1		2	0.4	0.5
Tribe-Tanytarsini	16	31	91	63	202	403	80.6	73.8
Cladotanytarsus spp.	2	17	5	17	12	53	10.6	6.9
Paratanytarsus spp.	2		6	1	7	16	3.2	3.1
Tanytarsus sp. 'Pc-brush'	1					1	0.2	0.4
Tanytarsus/Micropsectra spp.	11	14	80	45	183	333	66.6	70.8
DIPTERA:Tipulidae			2		1	3	0.6	0.9
Gonomyia sp.			2			2	0.4	0.9
Hexatoma sp.					1	1	0.2	0.4
DIPTERA:Misc.	1					1	0.2	0.4
Chaoboridae:Chaoborus (Sayomyia) punctipennis	1					1	0.2	0.4
GASTROPODA			9	1		10	2.0	3.9
Perrissia fragilis?			9	1		10	2.0	3.9
PELECYPODA	52	34	59	24	24	193	38.6	16.1
Pisidium adamsi		1				1	0.2	0.4
Pisidium casertanum	5	9	15	8	10	47	9.4	3.6
Pisidium ferrugineum			2	5		7	1.4	2.2
Pisidium lilljeborgi	4	5		10		19	3.8	4.1
Pisidium nitidum	43	18	41	1	14	117	23.4	18.1
Pisidium variabile		1	1			2	0.4	0.5

SKIDWAY LAKE OCT 20 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
OLIGOCHAETA	1	5			2	8	1.6	2.1
Enchytraeidae		3				3	0.6	1.3
Lumbriculus variegatus	1	2			1	4	0.8	0.8
Lumbriculidae					1	1	0.2	0.4
ISOPODA	24	75	15	1		115	23.0	30.7
Asellus forbesi	24	75	15	1		115	23.0	30.7
AMPHIPODA	81	48	44	116	22	311	62.2	36.7
Crangonyx laurentianus	80	48	44	67	21	260	52.0	22.6
Hyalella azteca	1			49	1	51	10.2	21.7
HYDRACARINA	1		1	1	2	5	1.0	0.7
Arrenurus (A.) auricularis					1	1	0.2	0.4
Limnesia undulata	1		1	1	1	4	0.8	0.4
EPHEMEROPTERA	440	199	200	251	492	1582	316.4	139.4
Caenis diminuta	9	34	71	19		133	26.6	27.8
Eurylophella temporalis	30	8		12	4	54	10.8	11.6
Leptophlebia intermedia	401	157	129	218	488	1393	278.6	157.9
Stenacron interpunctatum				2		2	0.4	0.9
ODONATA	26	49	83	63	43	264	52.8	21.5
Aeshna umbrosa		6				6	1.2	2.7
Basiaeschna janata		1			1	2	0.4	0.5
Celithemis eponica			2			2	0.4	0.9
Cordulia shurtleffi	3	6	1	1	7	18	3.6	2.8
Enallagma exsulans	1					1	0.2	0.4
Enallagma hageni	4	5	25	10		44	8.8	9.7
Enallagma vesperum	2		20	9	4	35	7.0	8.0
Epitheca cynosura		5	4	1	2	12	2.4	2.1
Gomphus exilis				1		1	0.2	0.4
Ischnura verticalis	11	8	12	16	8	55	11.0	3.3
Lestes vigilax			2			2	0.4	0.9
Leucorrhinia frigida			5	3	8	16	3.2	3.4
Leucorrhinia hudsonica	1	1	5	9	2	18	3.6	3.4
Libellula incesta	3	10	6	8	7	34	6.8	2.6
Libellula julia	1	7	1	5	4	18	3.6	2.6
HEMIPTERA	17	2	2	4	1	26	5.2	6.7
Cenocorixa n.sp.					1	1	0.2	0.4
Hesperocorixa kennicotti	11	2				13	2.6	4.8
Hesperocorixa michiganensis	4		1	3		8	1.6	1.8
Notonecta undulata	1		1	1		3	0.6	0.5
Ranatra fusca	1					1	0.2	0.4
MEGALOPTERA	3	3	3	3		12	2.4	1.3
Chauliodes sp.		1	1			2	0.4	0.5
Sialis sp.	3	2	2	3		10	2.0	1.2
TRICHOPTERA	106	91	91	119	89	496	99.2	13.0
Agrypnia cf. improba		1				1	0.2	0.4
Agrypnia straminea	18	3	13	8	4	46	9.2	6.3
Agrypnia vestita	3	2		5		10	2.0	2.1
Banksiola smithi			1			1	0.2	0.4
Nectopsyche sp.1	1		4	1		6	1.2	1.6
Nemotaulius hostilis				2	1	3	0.6	0.9
Nyctiophylax affinis		2	1		1	4	0.8	0.8
Oecetis cinerascens		1		2		3	0.6	0.9
Oecetis sp.1		3				3	0.6	1.3
Oecetis sp.2	1		1			2	0.4	0.5
Oecetis sp.4 (?ovara)				2		2	0.4	0.9

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
TRICHOPTERA cont'd	1	2	3	4	5			
Orthotrichia sp.				1		1	0.2	0.4
Oxyethira sp.1	1	20	8	7	8	44	8.8	6.9
Oxyethira sp.2	6		10	5	2	23	4.6	3.8
Phryganea sp.				1		1	0.2	0.4
Platycentropus sp.	5	7	9	6	12	39	7.8	2.8
Polycentropus sp.1	30	26	36	64	30	186	37.2	15.4
Polycentropus sp.2	20	17	5	10	1	53	10.6	8.0
Pycnopsyche sp(p)	20	9	3	3	3	65	13.0	7.4
Triaenodes sp.2	1			2		3	0.6	0.9
LEPIDOPTERA		3	1			4	0.8	1.3
Acentria sp.		3	1			4	0.8	1.3
COLEOPTERA	12	5	4		6	27	5.4	4.3
Dineutus horni	1				1	2	0.4	0.5
Dineutus nigrior					1	1	0.2	0.4
Gyrinus ventralis?	1					1	0.2	0.4
Hydroporus (Neoporus) undulatus	8	5	2		4	19	4.8	3.0
Stenelmis crenata	2					2	0.4	0.9
Tropisternus mixtus			2			2	0.4	0.9
Terrestrial form:Elateridae	3	2	1			6	1.2	1.3
DIPTERA:TOTAL	1090	949	1158	874	1969	6040	1208.0	439.9
DIPTERA:Ceratopogonidae	145	64	99	76	30	414	82.8	42.8
Bezzia sp.1	134	60	93	68	25	380	76.0	40.5
Bezzia sp.1A	2				1	3	0.6	0.9
Bezzia sp.2/2A		1	5	3	1	10	2.0	2.0
Bezzia sp.3		1				1	0.2	0.4
Bezzia sp.5	7		1	5	1	14	2.8	3.0
Dasyhelea sp.1 (pale head)		1				1	0.2	0.4
Probezzia sp.4	2	1			2	5	1.0	1.0
DIPTERA:Chironomidae	941	885	1058	797	1939	5620	1124.0	465.3
Subfam.-Tanypodinae	199	160	216	156	225	956	191.2	31.7
Ablabesmyia (s.str.) spp.	65	13	130	40	83	331	66.2	44.4
Conchapelopia sp.	40	50	42	59	48	239	47.8	7.5
Guttipelopia guttipennis	2	22	2	1	2	29	5.8	9.1
Labrundinia neopilosella	1				1	2	0.4	0.5
Larsia indistincta	31	22	9	5	26	93	18.6	11.1
Natarsia baltimoreus	41	29	12	8	10	100	20.0	14.4
Procladius (s.lat.) spp.	19	24	21	43	55	162	32.4	15.8
Subfam.-Orthocladiinae	149	49	119	93	165	575	115.0	46.1
Brillia parva	2					2	0.4	0.9
Corynoneura sp.1	3					10	2.0	1.3
Cricotopus (s.str.) sp. bicinctus gr.			1		3	4	0.8	1.4
Psectrocladius (Mono.) cf.calcaratus	11	3	17	38	48	117	23.4	18.9
Psectrocladius (s.str.) litofilus	52	32	47	23	80	234	46.8	21.9
Psectrocladius (s.str.) simulans	2	2	8	9	1	22	4.4	3.8
Psectrocladius (s.str.) sordidellus	61	8	35	12	1	117	23.4	24.6
Pseudorthocladius sp.	2				1	3	0.6	0.9
Stackelbergina n.sp.	3	1	6	11	24	45	9.0	9.2
Zalutschia sp.1	13	3	5			21	4.2	5.4

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
Subfam.–Chironominae	593	676	723	548	1549	4089	817.8	414.4
Tribe–Chironomini	527	634	701	527	1433	3822	764.4	381.0
Chironomus (s.str.) spp.	69	286	232	258	787	1632	326.4	270.9
Cladopelma sp.		1				1	0.2	0.5
Cryptochironomus conus	2			1	1	4	0.8	0.8
Dicrotendipes leucoscelis	1	4	1	1	1	8	1.6	1.3
Dicrotendipes modestus	27	16	76	26	75	220	44.0	29.1
Dicrotendipes tritomus	45	6	46	18	1	116	23.2	21.3
Endochironomus nigricans	33	84	36	82	138	373	74.6	43.0
Glyptotendipes sp.1 gr."A"	2	1	2			5	1.0	1.0
Glyptotendipes sp. gr."B"			1			1	0.2	0.5
Lauterborniella agrayloides	19	29	40	3	7	98	19.6	15.3
Microtendipes pedellus	23	50	55	83	183	394	78.8	62.0
Nilothauma babiyi	5	12	6	5	10	38	7.6	3.2
Omisus ?caledonicus		54	11	1	24	90	18.0	22.3
Parachironomus abortivus	1					1	0.2	0.4
Paratendipes cf. nudisquama					4	4	0.8	1.8
Phaenopsectra flavipes		6	3		6	15	3.0	3.0
Phaenopsectra sp.		1				1	0.2	0.4
Polypedilum (s.str.) fallax gr.					1	1	0.2	0.4
Polypedilum (s.str.) trigonum			3			3	0.6	1.3
Polypedilum (s.lat.) sp.1	243	19	159	17	137	575	115.0	97.0
Polypedilum (s.lat.) sp.3	2	3	1	3	12	21	4.2	4.4
Polypedilum (Tripodura) simulans	6	4	6	1	2	19	3.8	2.3
Pseudochironomus spp.	1	2	1	1	1	6	1.2	0.4
Stenochironomus hilaris	4	1			3	8	1.6	1.8
Stictochironomus sp.1/3		1			1	2	0.4	0.5
Tribelos jucundum	40	50	10	22	34	156	31.2	15.6
Zavreliella marmorata	4	4	12	5	5	30	6.0	3.4
Tribe–Tanytarsini	66	42	22	21	116	267	53.4	39.5
Cladotanytarsus spp.	4	1			3	8	1.6	1.8
Paratanytarsus spp.	5	1	11		1	18	3.6	4.6
Tanytarsus/Micropsectra spp.	57	40	11	21	112	241	48.2	39.8
DIPTERA:Tabanidae				1		1	0.2	0.4
Tabanus marginalis				1		1	0.2	0.4
DIPTERA:Tipulidae	3					3	0.6	1.3
Pedicia sp.	3					3	0.6	1.3
DIPTERA:Misc.	1		1			2	0.4	0.5
Dolichopodidae	1		1			2	0.4	0.5
DIPTERA-indet./terrestrial forms	1					1	0.2	0.4
PELECYPODA		3		3		6	1.2	1.6
Pisidium casertanum		3		2		5	1.0	1.4
Pisidium nitidum				1		1	0.2	0.4

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
TURBELLARIA	1				7	8	1.6	3.0
Dugesia tigrina	1				7	8	1.6	3.0
NEMATODA	1		1			2	0.4	0.5
Anatonchus sp.	1		1			2	0.4	0.5
OLIGOCHAETA	38	7	15	10	19	89	17.8	12.2
Enchytraeidae	7		4	1	17	29	5.8	6.8
Ilyodrilus templetoni	3	1	5			9	1.8	2.2
Lumbriculus variegatus	26	6	5	6	1	44	8.8	9.8
Lumbriculidae	2			2		4	0.8	1.1
Slavania appendiculata				1		1	0.2	0.4
Uncinais uncinata			1		1	2	0.4	0.5
HIRUDINEA	1	9	4	1	1	16	3.2	3.5
Erpobdella punctata					1	1	0.2	0.4
Oloiobdella elongata		5	1			6	1.2	2.2
Helobdella stagnalis	1	3				4	0.8	1.3
Macrobdella decora				1		1	0.2	0.4
Nephelopsis obscura			3			3	0.6	1.3
Placobdella ornata		1				1	0.2	0.4
AMPHIPODA	219	130	35	248	680	1312	262.4	247.9
Crangonyx laurentianus	34	27	30	20	2	113	22.6	12.6
Hyalella azteca	185	103	5	228	678	1199	239.8	259.3
EPHEMEROPTERA	147	65	149	49	7	417	83.4	62.7
Caenis diminuta	66	9	8	2		85	17.0	27.7
Eurylophella temporalis	58	25	137	41	7	268	53.6	50.3
Leptophlebia intermedia	20	31	4			55	11.0	13.9
Stenacron interpunctatum				4		4	0.8	1.8
Stenonema (s.str.) femoratum	3			2		5	1.0	1.4
ODONATA	3				28	31	6.2	12.3
Basiaeschna janata					1	1	0.2	0.4
Enallagma hageni	2				24	26	5.2	10.5
Gomphus exilis	1				2	3	0.6	0.9
Libellula julia					1	1	0.2	0.4
PLECOPTERA			2			2	0.4	0.9
Soyedina sp.			2			2	0.4	0.9
HEMIPTERA	3	2		2		7	1.4	1.3
Notonecta undulata	1	2		2		5	1.0	1.0
Sigara (Phaeo.) mackinacensis	2					2	0.4	0.9
MEGALOPTERA			1			1	0.2	0.4
Sialis sp.			1			1	0.2	0.4
TRICHOPTERA	9	15	13	1		38	7.6	6.8
Agarodes cf. distinctus	2					2	0.4	0.9
Lype diversa			1			1	0.2	0.4
Molanna ulmerina-uniophila	1					1	0.2	0.4
Nectopsyche sp.1	2	1	1			4	0.8	0.8
Nectopsyche sp.3 nr. pavida			1			1	0.2	0.4
Oecetis sp.1	1	2	4			7	1.4	1.7
Oecetis sp.2	2	1				3	0.6	0.9
Ptilostomis cf. ocellifera		1				1	0.2	0.4
Pycnopsyche sp(p)	1	6	4	1		12	2.4	2.5
Triaenodes sp.1		2				2	0.4	0.9
Triaenodes sp.2		2	2			4	0.8	1.1
LEPIDOPTERA	1				2	3	0.6	0.9
Eoparargyractis sp.	1				2	3	0.6	0.9
COLEOPTERA	3	3	1	3	15	25	5.0	5.7
Berosus sp.					1	1	0.2	0.4
Dineutus nigrior		3				3	0.6	1.3
Hydroporus (Neoporus) undulatus			1			1	0.2	0.4
Stenelmis crenata	3			3	14	20	4.0	5.8
DIPTERA	239	258	297	48	321	1163	233.0	108.1
DIPTERA:Ceratopogonidae	11	2	18		93	124	24.8	38.8
Bezzia sp.1	1	1				2	0.4	0.5
Bezzia sp.3	8		3		1	12	2.4	3.4
Bezzia sp.4		1	4		11	16	3.2	4.7
Culicoides (O.) stellifer			4			4	0.8	1.8
Forcipomyia sp.			1			1	0.2	0.4
Dasyhelea sp.1 (pale head)			1		17	18	3.6	7.5
Dasyhelea sp.2 (dark head)	1		1		61	63	12.6	27.1
Probezzia sp.1	1		3		3	7	1.4	1.5
Stilobezzia sp.			1			1	0.2	0.4

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA:Chironomidae	228	256	269	48	223	1024	204.8	89.7
Subfam.-Tanypodinae	61	74	83	9	35	262	52.4	30.3
Ablabesmyia (s.str.) spp.	28	17	33	6	5	89	17.8	12.6
Clinotanypus pinguis		5				5	1.0	2.2
Conchapelopia sp.	3	1	28	1	16	49	9.8	11.9
Larsia canadensis	2			1	2	5	1.0	1.0
Procladius (s.str.) spp.	26	50	12	1	7	96	19.2	19.5
Thienemannimyia norena					5	5	1.0	2.2
Zavrelimyia sp.	2	1	10			13	2.6	4.2
Subfam.-Prodiamesinae	2		1	2		5	1.0	1.0
Monodiamesa nr. bathyphila	2		1	2		5	1.0	1.0
Subfam.-Orthocladiinae	9	15	12	1	4	41	8.2	5.7
Corynoneura nr. scutellata		1				1	0.2	0.4
Heterotrissocladius changi	2		3		1	6	1.2	1.3
Heterotrissocladius hirtapex	4	1	5	1		11	2.2	2.2
Parametriocnemus lundbecki			1			1	0.2	0.4
Psectrocladius (s.str.) litofilus	1	1	1		2	5	1.0	0.7
Psectrocladius (s.str.) simulans		1				1	0.2	0.4
Pseudosmittia sp.1			1			1	0.2	0.4
Stackelbergina n.sp.		11			1	12	2.4	4.8
Xylotopus par			1			1	0.2	0.4
Zalutschia obscepta	2					2	0.4	0.9
Subfam.-Chironominae	156	167	173	36	184	716	143.2	60.8
Tribe-Chironomini	101	115	84	29	47	376	75.2	36.3
Chironomus (s.str.) spp.	5	16	3			24	4.8	6.6
Cryptochironomus conus	5		10	2	7	24	4.8	4.0
Demicryptochironomus cuneatus	1					1	0.2	0.4
Dicrotendipes leucoscelis			1			1	0.2	0.4
Dicrotendipes modestus	1	11	12	2	2	28	5.6	5.4
Dicrotendipes nervosus			1			1	0.2	0.4
Dicrotendipes tritomus	55	6	2	9	9	81	16.2	21.9
Endochironomus nigricans	1					1	0.2	0.4
Glyptotendipes sp. 1 gr."A"			3	1		4	0.8	1.3
Lauterborniella agrayloides			1			1	0.2	0.4
Microtendipes pedellus	24	64	26	9	9	132	26.4	22.5
Nilothauma babiyi			3		1	4	0.8	1.3
Paratendipes albimanus			4	1		5	1.0	1.7
Phaenopsectra flavipes			5			5	1.0	2.2
Polypedilum (Tripodura) simulans		3	3	1		7	1.4	1.5
Pseudochironomus articaudus			2		6	8	1.6	2.6
Pseudochironomus sp(p.)	9		4	1	1	15	3.0	3.7
Stenochironomus hilaris				1		1	0.2	0.4
Stictochironomus sp.1/3			3	2	12	17	3.4	5.0
Tribelos jucundum		15	1			16	3.2	6.6
Tribe-Tanytarsini	55	52	89	7	137	340	68.0	48.3
Cladotanytarsus spp.	10		9		35	54	10.8	14.3
Paratanytarsus spp.	2		2		26	30	6.0	11.2
Stempellina sp.					1	1	0.2	0.4
Tanytarsus/Micropsectra spp.	43	52	77	7	75	254	50.8	28.5
Zavrelia sp.			1			1	0.2	0.4
DIPTERA:Misc.			2		5	7	1.4	2.2
Dolichopodidae			1			1	0.2	0.4
Empididae:Hemerodromia sp.					5	5	1.0	2.2
Empididae: other genera			1			1	0.2	0.4
DIPTERA-indet./terrestrial forms			8			8	1.6	3.6
GASTROPODA	1		1	1	2	5	1.0	0.7
Amnicola limosa					2	2	0.4	0.9
Perrissia fragilis	1		1	1		3	0.6	0.9
PELECYPODA	3	2	56	6	150	217	43.4	63.8
Pisidium casertanum	2	1	40	6		49	9.8	17.0
Pisidium ferrugineum		1			137	138	27.6	61.2
Pisidium lilljeborgi					13	13	2.6	5.8
Pisidium nitidum			16			16	3.2	7.2
Pisidium variabile	1					1	0.2	0.4

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA		1	3			4	0.8	1.3
Anatonchus sp.			2			2	0.4	0.9
Mermithidae		1	1			2	0.4	0.5
OLIGOCHAETA	2	5	4	6	6	23	4.6	1.7
Enchytraeidae	1	1			5	7	1.4	2.1
Ilyodrilus templetoni				3		3	0.6	1.3
Lumbriculus variegatus		2	2	3		7	1.4	1.3
Lumbriculidae		2	1			3	0.6	0.9
Tubificidae + hairs	1		1		1	3	0.6	0.5
HIRUDINEA	3			6		9	1.8	2.7
Erpobdella punctata	1			2		3	0.6	0.9
Gloiobdella elongata				2		2	0.4	0.9
Glossiphonia complenata	1					1	0.2	0.4
Helobdella stagnalis	1			2		3	0.6	0.9
AMPHIPODA	532	153	270	873	152	1980	396.0	308.4
Crangonyx laurentianus	2			19		21	4.2	8.3
Hyalella azteca	530	153	270	854	152	1959	391.8	300.9
DECAPODA				1		1	0.2	0.4
Orconectes propinquus				1		1	0.2	0.4
HYDRACARINA			1			1	0.2	0.4
Arrenurus (Mega.) elevatus			1			1	0.2	0.4
EPHEMEROPTERA	28	5	5	55	25	118	23.6	20.6
Caenis punctata	5			2	4	11	2.2	2.3
Cleon rubropictum			1			1	0.2	0.4
Eurylophella latulenta					1	1	0.2	0.4
Ephemera simulans	1	1		1	13	16	3.2	5.5
Eurylophella temporalis				4	3	7	1.4	1.9
Hexagenia limbata			1			1	0.2	0.4
Leptophlebia intermedia	22	4	3	43	3	75	15.0	17.6
Stenonema (s.str.)femoratum				5	1	6	1.2	2.2
ODONATA	31	3	8	8	17	67	13.4	11.1
Basiaeschna janata	1					1	0.2	0.4
Dromogomphus spinosus	3					3	0.6	1.3
Enallagma exsulans	2		2		8	12	2.4	3.3
Enallagma hageni	21		6		7	34	6.8	8.6
Epitheca cynosura	2			4		6	1.2	1.8
Gomphus exilis	2	2			2	6	1.2	1.1
Ischnura verticalis				4		4	0.8	1.8
Leucorrhinia hudsonica		1				1	0.2	0.4
PLECOPTERA	1					1	0.2	0.4
Nemoura trispinosa	1					1	0.2	0.4
MEGALOPTERA	1					1	0.2	0.4
Sialis sp.	1					1	0.2	0.4
TRICHOPTERA	28	9	7	6	2	52	10.4	10.2
Agarodes cf. distinctus	1			1		2	0.4	0.5
Molanna ulmerina-uniophila	2	5	1	2	1	11	2.2	1.6
Mystacides sepulchralis	6	1	1		1	9	1.8	2.4
Oecetis cinerascens	2					2	0.4	0.9
Oecetis sp.1	8		1	2		11	2.2	3.3
Oecetis sp.2			1			1	0.2	0.4
Phylocentropus sp.	1	1				2	0.4	0.5
Polycentropus sp.2	1		1			2	0.4	0.5
Ptilostomis cf. ocellifera	3					3	0.6	1.3
Pycnopsyche sp(p)	2	2	1	1		6	1.2	0.8
Triaenodes sp.1			1			1	0.2	0.4
Triaenodes sp.2	2					2	0.4	0.9
LEPIDOPTERA			2			2	0.4	0.9
Eoparargyractis sp.			2			2	0.4	0.9
COLEOPTERA			2	7	2	11	2.2	2.9
Berosus sp.			1			1	0.2	0.4
Dineutus nigrior				3		3	0.6	1.3
Dubiraphia minima-vitatta			1	2		3	0.6	0.9
Haliplus pantherinus				1		1	0.2	0.4
Stenelmis crenata				1	2	3	0.6	0.9

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TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	165	115	110	209	50	649	129.8	60.2
DIPTERA:Ceratopogonidae	3	5	8	4	1	21	4.2	2.6
Bezzia sp.4		5	4			9	1.8	2.5
Bezzia sp.6	3					3	0.6	1.3
Palpomyia sp.2				1		1	0.2	0.4
Probezzia sp.1			4		1	5	1.0	1.7
Probezzia sp.2				3		3	0.6	1.3
DIPTERA:Chironomidae	161	110	102	203	49	625	125.0	59.0
Subfam.-Tanypodinae	111	46	66	62	42	327	65.4	27.5
Ablabesmyia (s.str.) spp.	15	2	1	13	1	32	6.4	7.0
Clinotanypus pinguis	3			8		11	2.2	3.5
Conchapelopia sp.	21	1	2	4	26	54	10.8	11.8
Djalmabatista pulcher	9	24	19		10	62	12.4	9.3
Larsia canadensis	36	19	2	9	5	71	14.2	13.8
Procladius (s.lat.) spp.	27		42	28		97	19.4	18.7
Subfam.-Diamesinae		2	1			3	0.6	0.9
Potthastia sp.1 longimana gr.		2	1			3	0.6	0.9
Subfam.-Prodiamesinae		2	1			3	0.6	0.9
Monodiamesa nr. bathyphila		2	1			3	0.6	0.9
Subfam.-Orthocladiinae		1	1	2	1	5	1.0	0.7
Epoicocladius flavens					1	1	0.2	0.4
Psectrocladius (s.str.) litofilus				1		1	0.2	0.4
Stackelbergina n.sp.		1				1	0.2	0.4
Xylotopus par			1	1		2	0.4	0.5
Subfam.-Chironominae	50	59	33	139	6	287	57.4	49.9
Tribe-Chironomini	45	56	16	108	6	231	46.2	40.1
Cryptochironomus conus	3	3	2	1		9	1.8	1.3
Cryptochironomus spp.	1		1			2	0.4	0.5
Demicryptochironomus cuneatus		3				3	0.6	1.3
Dicrotendipes leucoscelis				2		2	0.4	0.9
Dicrotendipes modestus	1			1	1	3	0.6	0.5
Dicrotendipes tritomus	1					1	0.2	0.4
Endochironomus nigricans	1			28		29	5.8	12.4
Glyptotendipes sp. gr."B"				3		3	0.6	1.3
Microtendipes pedellus	5			28		33	6.6	12.2
Pagastiella ostansa	1	1		24		26	5.2	10.5
Paratendipes cf. nudisquama		1		2	1	4	0.8	0.8
Polypedilum (Pentapedilum) sordens	2			5		7	1.4	2.2
Polypedilum (s.str.) scalaenum	3					3	0.6	1.3
Polypedilum (Tripodura) simulans					1	1	0.2	0.4
Pseudochironomus articaudus		1	1			2	0.4	0.5
Pseudochironomus spp.	15	5	6			26	5.2	6.1
Stenochironomus hilaris	2	2				4	0.8	1.1
Stictochironomus sp.1/3	1	40	6		2	49	9.8	17.0
Tribelos jucundum	9			7	1	17	3.4	4.3
Zavreliella marmorata				7		7	1.4	3.1
Tribe-Tanytarsini	5	3	17	31		56	11.2	12.8
Cladotanytarsus spp.	4	3	1	2		10	2.0	1.6
Parstanytarsus spp.	1					1	0.2	0.4
Stempellinella sp.				2		2	0.4	0.9
Tanytarsus/Micropsectra spp.			16	27		43	8.6	12.4
DIPTERA:Tabanidae	1					1	0.2	0.4
Chrysops ?excitans	1					1	0.2	0.4
DIPTERA:Tipulidae				2		2	0.4	0.9
Erioptera sp.				2		2	0.4	0.9
GASTROPODA	50	10	27	2	7	96	19.2	19.6
Amnicola limosa	30	7	26		7	70	14.0	13.2
Campeloma decisum	3	1				4	0.8	1.3
Helisoma anceps	11	1				12	2.4	4.8
Physella (s.str.) gyrina	1	1	1			3	0.6	0.5
Menetus (Micro.) dilatatus?	5			2		7	1.4	2.2
PELECYPODA	150	8	57		16	231	46.2	62.0
Pisidium casertanum	120	7	22		16	165	33.0	49.4
Pisidium nitidum			35			35	7.0	15.7
Pisidium variabile	30	1				31	6.2	13.3

APPENDIX 6

FALL 1988 BENTHOS SUMMARY BY TAXONOMIC ORDER OR SUB-FAMILY

BLUE CHALK LAKE NOV 2 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	2		2	1	1	2
OLIGOCHAETA	3			3	3	4
HIRUDINEA					1	1
AMPHIPODA	1	1	1	1	2	2
DECAPODA		1				1
EPHEMEROPTERA	5	5	4	5	5	8
ODONATA	4	4	5		5	9
PLECOPTERA					1	1
TRICHOPTERA	9	5	3	5	6	12
LEPIDOPTERA	1					1
COLEOPTERA	3	2	1	2	1	5
DIPTERA TOTAL	38	26	24	25	39	61
DIPTERA:Ceratopogonida	4	1	1	3	7	11
DIPTERA:Chironomidae	33	25	23	22	30	48
Subfam.-Podonominae					1	1
Subfam.-Tanypodinae	8	7	5	5	6	8
Subfam.-Prodiamesinae					1	1
Subfam.-Orthocladiinae	7	5	6	4	6	12
Subfam.-Chironominae	18	13	12	13	16	26
Tribe-Chironomini	14	12	10	10	12	22
Tribe-Tanytarsini	4	1	2	3	4	4
DIPTERA:Tipulidae					1	1
DIPTERA:Misc.	1				1	1
GASTROPODA	1		1		1	3
PELECYPODA	1	1	2			2
TOTAL SPECIES	68	45	43	42	65	112

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	5		7	1	1	14
OLIGOCHAETA	26			10	6	42
HIRUDINEA					1	1
AMPHIPODA	615	119	172	61	374	1341
DECAPODA		1				1
EPHEMEROPTERA	153	176	106	45	118	598
ODONATA	22	5	18		38	83
PLECOPTERA					1	1
TRICHOPTERA	25	9	5	9	28	76
LEPIDOPTERA	2					2
COLEOPTERA	40	4	6	10	18	78
DIPTERA TOTAL	320	126	424	206	229	1305
DIPTERA:Ceratopogonidae	11	3	7	20	21	62
DIPTERA:Chironomidae	308	123	417	186	198	1232
Subfam.-Podonominae					1	1
Subfam.-Tanypodinae	166	67	153	93	65	544
Subfam.-Prodiamesinae					3	3
Subfam.-Orthocladiinae	56	12	18	13	44	143
Subfam.-Chironominae	86	44	246	80	85	541
Tribe-Chironomini	58	43	142	61	42	346
Tribe-Tanytarsini	28	1	104	19	43	195
DIPTERA:Tipulidae					8	8
DIPTERA:Misc.	1				2	3
GASTROPODA	1		1		1	3
PELECYPODA	2	1	5			8
TOTAL INDIVIDUALS	1211	441	744	342	815	3553

CLEAR LAKE OCT 26 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA				2		2
OLIGOCHAETA	3	3	1	3	3	4
HIRUDINEA	1		2			2
AMPHIPODA	2	2	2	2	2	2
EPHEMEROPTERA	4	3	4	3	4	5
ODONATA	4	1	1	3	7	10
HEMIPTERA				1		1
MEGALOPTERA	1				1	1
TRICHOPTERA	4	5	2	11	3	13
LEPIDOPTERA				1		1
COLEOPTERA	1		1	2		3
DIPTERA TOTAL	16	11	22	30	23	51
DIPTERA:Ceratopogonida	1		5	5	2	8
DIPTERA:Chironomidae	15	10	17	25	20	41
Subfam.–Podonominae			1			1
Subfam.–Tanypodinae	4	4	4	3	4	7
Subfam.–Prodiamesinae		1	1	1		1
Subfam.–Orthocladiinae	2	2	1	7	7	8
Subfam.–Chironominae	9	3	10	14	9	24
Tribe–Chironomini	8	3	10	11	7	21
Tribe–Tanytarsini	1			3	2	3
DIPTERA:Tipulidae					1	1
DIPTERA:Misc.		1				1
GASTROPODA	1		1			1
PELECYPODA	1	2	2	3	2	4
TOTAL SPECIES	38	27	38	61	45	100

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA				5		5
OLIGOCHAETA	6	6	12	48	14	86
HIRUDINEA	1		2			3
AMPHIPODA	149	22	325	490	70	1056
EPHEMEROPTERA	28	23	21	277	192	541
ODONATA	9	1	1	22	22	55
HEMIPTERA				3		3
MEGALOPTERA	3				22	25
TRICHOPTERA	7	38	4	28	13	90
LEPIDOPTERA				3		3
COLEOPTERA	1		20	4		25
DIPTERA TOTAL	128	52	195	284	213	872
DIPTERA:Ceratopogonida	2		21	55	2	80
DIPTERA:Chironomidae	126	51	174	229	210	790
Subfam.–Podonominae			1			1
Subfam.–Tanypodinae	11	8	15	60	57	151
Subfam.–Prodiamesinae		7	8	3		18
Subfam.–Orthocladiinae	2	5	1	22	24	54
Subfam.–Chironominae	113	31	149	144	129	566
Tribe–Chironomini	61	31	149	131	122	494
Tribe–Tanytarsini	52			13	7	72
DIPTERA:Tipulidae					1	1
DIPTERA:Misc.		1				1
GASTROPODA	1		1			2
PELECYPODA	4	7	10	59	5	85
TOTAL INDIVIDUALS	337	149	591	1223	551	2851

CRADLE LAKE OCT 26 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE 1	2	3	4	5	TOTAL
OLIGOCHAETA	2	1	1		2	2
HIRUDINEA		1	1	1	1	2
AMPHIPODA	2	2	2	2	1	2
DECAPODA	1				1	1
EPHEMEROPTERA	3	3	3	4	2	5
ODONATA	1	2	2	2	4	9
HEMIPTERA	1	1		2		3
TRICHOPTERA	1	6	7	6	6	15
LEPIDOPTERA					1	1
COLEOPTERA		1	1	1	1	1
DIPTERA TOTAL	10	23	20	17	23	44
DIPTERA:Ceratopogonidae		5	3	1	2	8
DIPTERA:Chironomidae	10	18	17	16	21	36
Subfam.–Tanypodinae	2	3	3	4	5	5
Subfam.–Prodiamesinae			1			1
Subfam.–Orthocladiinae	2	2	2	1	5	6
Subfam.–Chironominae	6	13	11	11	11	24
Tribe–Chironomini	5	11	8	9	9	21
Tribe–Tanytarsini	1	2	3	2	2	3
GASTROPODA			1		1	1
PELECYPODA	1	1	2	1	1	2
TOTAL SPECIES	22	41	40	36	44	88

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE 1	2	3	4	5	TOTAL
OLIGOCHAETA	8	3	8		2	21
HIRUDINEA		1	1	1	2	5
AMPHIPODA	315	19	194	25	502	1055
DECAPODA	1				1	2
EPHEMEROPTERA	35	84	84	16	136	355
ODONATA	2	2	2	7	13	26
HEMIPTERA	1	1		2		4
TRICHOPTERA	1	10	13	7	5	36
LEPIDOPTERA					2	2
COLEOPTERA		1	6	1	1	9
DIPTERA TOTAL	83	128	275	834	326	1646
DIPTERA:Ceratopogonidae		8	7	1	3	19
DIPTERA:Chironomidae	83	120	268	833	323	1627
Subfam.–Tanypodinae	18	27	43	114	20	222
Subfam.–Prodiamesinae			1			1
Subfam.–Orthocladiinae	35	28	32	4	41	140
Subfam.–Chironominae	30	65	192	715	262	1264
Tribe–Chironomini	25	53	180	559	65	882
Tribe–Tanytarsini	5	12	12	156	197	382
GASTROPODA			2		1	3
PELECYPODA	1	2	9	13	1	26
TOTAL INDIVIDUALS	447	251	594	906	992	3190

CROSSON LAKE OCT 26 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA	1					1
NEMATODA		1		1		1
OLIGOCHAETA	4	2	1			4
HIRUDINEA		1	3	1		3
AMPHIPODA	2	2	2	2	2	2
HYDRACARINA			1			1
EPHEMEROPTERA	5	6	3	6	5	7
ODONATA	6	11	10	3	6	14
HEMIPTERA			1			1
MEGALOPTERA	1	1				2
TRICHOPTERA	8	6	10	4	6	14
COLEOPTERA	3	3	1	3	1	3
DIPTERA TOTAL	31	23	28	16	21	43
DIPTERA:Ceratopogonidae	2	4	7	1		8
DIPTERA:Chironomidae	29	19	21	15	21	35
Subfam.–Podonominae		1				1
Subfam.–Tanypodinae	5	4	4	5	4	7
Subfam.–Orthocladiinae	5	3	3		2	5
Subfam.–Chironominae	19	11	14	10	15	22
Tribe–Chironomini	16	9	12	9	13	19
Tribe–Tanytarsini	3	2	2	1	2	3
GASTROPODA	3			1	1	3
PELECYPODA	1			1	1	2
TOTAL SPECIES	65	56	60	38	43	101

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA	1					1
NEMATODA		1		1		2
OLIGOCHAETA	13	6	4	0	0	23
HIRUDINEA	0	1	6	1	0	8
AMPHIPODA	870	239	366	78	258	1811
HYDRACARINA	0	0	1	0	0	1
EPHEMEROPTERA	112	347	191	104	51	805
ODONATA	115	62	98	22	27	324
HEMIPTERA	0	0	1	0	0	1
MEGALOPTERA	1	6	0	0	0	7
TRICHOPTERA	28	18	26	7	63	142
COLEOPTERA	52	50	1	4	5	112
DIPTERA TOTAL	402	341	608	54	222	1627
DIPTERA:Ceratopogonidae	9	8	17	1	0	35
DIPTERA:Chironomidae	393	333	591	53	222	1592
Subfam.–Podonominae	0	1	0	0	0	1
Subfam.–Tanypodinae	178	113	346	28	64	729
Subfam.–Orthocladiinae	55	122	55	0	4	236
Subfam.–Chironominae	160	97	190	25	154	626
Tribe–Chironomini	63	56	80	22	130	351
Tribe–Tanytarsini	97	41	110	3	24	275
GASTROPODA	25	0	0	1	21	47
PELECYPODA	1	0	0	1	2	4
TOTAL INDIVIDUALS	1620	1071	1302	273	649	4915

DELANO LAKE OCT 26 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	1					1
OLIGOCHAETA	2		2		1	3
HIRUDINEA	1			1		2
AMPHIPODA	2	2	2	2	2	2
EPHEMEROPTERA	5	4	4	4	5	5
ODONATA	8	11	3	4	8	13
HEMIPTERA		1				1
MEGALOPTERA				1		1
TRICHOPTERA	1	4	3	6	5	13
COLEOPTERA	1	2		1		3
DIPTERA TOTAL	21	15	23	28	10	45
DIPTERA:Ceratopogonidae	1	1	4	3	1	6
DIPTERA:Chironomidae	20	14	19	25	9	39
Subfam.–Tanypodinae	6	4	5	5	3	8
Subfam.–Orthocladiinae	3	2	3	4		7
Subfam.–Chironominae	11	8	11	16	6	24
Tribe–Chironomini	8	7	10	14	5	21
Tribe–Tanytarsini	3	1	1	2	1	3
GASTROPODA		1			1	2
PELECYPODA	1	2	3	1		3
TOTAL SPECIES	43	42	40	48	32	94

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	1					1
OLIGOCHAETA	3		2		3	8
HIRUDINEA	1			2		3
AMPHIPODA	303	267	43	13	57	683
EPHEMEROPTERA	157	246	163	145	57	768
ODONATA	28	53	15	14	26	136
HEMIPTERA		1				1
MEGALOPTERA				1		1
TRICHOPTERA	1	17	4	9	7	38
COLEOPTERA	5	4		9		18
DIPTERA TOTAL	59	88	125	195	32	499
DIPTERA:Ceratopogonidae	1	1	7	4	1	14
DIPTERA:Chironomidae	58	87	118	191	31	485
Subfam.–Tanypodinae	28	44	64	74	8	218
Subfam.–Orthocladiinae	4	8	8	6		26
Subfam.–Chironominae	26	35	46	111	23	241
Tribe–Chironomini	20	25	40	74	16	175
Tribe–Tanytarsini	6	10	6	37	7	66
GASTROPODA		1			1	2
PELECYPODA	5	12	12	2		31
TOTAL INDIVIDUALS	563	689	364	390	183	2189

HAMER LAKE OCT 20 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA					1	1
OLIGOCHAETA	2	5	4	4	4	6
HIRUDINEA	1	1				2
AMPHIPODA	2	2	2	2	2	2
HYDRACARINA	2	3	1	6	5	8
EPHEMEROPTERA	3	4	5	2	3	5
ODONATA	7	14	12	12	9	16
MEGALOPTERA		1	1			1
TRICHOPTERA	5	10	7	5	8	13
COLEOPTERA			1	1		2
DIPTERA TOTAL	26	24	23	32	25	50
DIPTERA:Ceratopogonidae	3	3	3	7	3	8
DIPTERA:Chironomidae	22	21	20	24	21	39
Subfam.–Tanypodinae	5	4	5	4	4	6
Subfam.–Orthocladiinae	5	6	5	4	4	8
Subfam.–Chironominae	12	11	10	16	13	25
Tribe–Chironomini	12	9	9	14	12	22
Tribe–Tanytarsini		2	1	2	1	3
DIPTERA:Tabanidae					1	1
DIPTERA:Tipulidae	1					1
DIPTERA:Misc.				1		1
GASTROPODA	1	1	1		1	1
PELECYPODA	2	2	4	4	1	4
TOTAL SPECIES	51	67	61	68	59	111

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA					1	1
OLIGOCHAETA	7	30	8	5	14	64
HIRUDINEA	1	1				2
AMPHIPODA	69	513	1045	1365	625	3617
HYDRACARINA	5	3	9	8	16	41
EPHEMEROPTERA	82	656	408	165	361	1672
ODONATA	12	83	58	76	85	314
MEGALOPTERA		1	1			2
TRICHOPTERA	31	151	88	32	104	406
COLEOPTERA			1	3		4
DIPTERA TOTAL	129	362	284	458	288	1521
DIPTERA:Ceratopogonidae	19	23	201	113	33	389
DIPTERA:Chironomidae	109	339	83	344	254	1129
Subfam.–Tanypodinae	28	139	45	152	111	475
Subfam.–Orthocladiinae	8	143	16	71	81	319
Subfam.–Chironominae	73	57	22	121	62	335
Tribe–Chironomini	73	50	20	105	58	306
Tribe–Tanytarsini		7	2	16	4	29
DIPTERA:Tabanidae					1	1
DIPTERA:Tipulidae	1					1
DIPTERA:Misc.				1		1
GASTROPODA	3	3	2		1	9
PELECYPODA	7	52	157	37	17	270
TOTAL INDIVIDUALS	346	1855	2061	2149	1512	7923

HARP LAKE OCT 14 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA	1	1	1	1	1	1
OLIGOCHAETA	4	2	4	3	4	5
HIRUDINEA		1		1		2
AMPHIPODA	1	1	1	2	1	2
EPHEMEROPTERA	3	4	4	5	6	7
ODONATA	9	5	5	6	6	10
PLECOPTERA			1			1
HEMIPTERA					1	1
MEGALOPTERA	1			1		1
TRICHOPTERA	6	4	4	9	6	12
LEPIDOPTERA	1	1				1
COLEOPTERA	1	3	1	2	3	4
DIPTERA TOTAL	28	14	22	17	26	42
DIPTERA:Ceratopogonidae	4	1	4	3	6	8
DIPTERA:Chironomidae	23	13	18	14	20	33
Subfam.–Tanypodinae	6	5	5	6	7	7
Subfam.–Prodiamesinae	1	1	1	1	1	1
Subfam.–Orthocladiinae	3	2	3	1	3	5
Subfam.–Chironominae	13	5	9	6	9	20
Tribe–Chironomini	11	4	6	6	8	17
Tribe–Tanytarsini	2	1	3		1	3
DIPTERA:Tipulidae	1					1
GASTROPODA	4	1	1	2	1	4
PELECYPODA	4	2	1	3	4	5
TOTAL SPECIES	63	39	45	52	59	98

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA	1	17	5	1	3	27
OLIGOCHAETA	19	5	18	8	11	61
HIRUDINEA		1		2		3
AMPHIPODA	700	327	351	161	556	2095
EPHEMEROPTERA	57	54	12	159	42	324
ODONATA	164	31	24	30	97	346
PLECOPTERA			1			1
HEMIPTERA					1	1
MEGALOPTERA	2			1		3
TRICHOPTERA	16	7	23	19	12	77
LEPIDOPTERA	2	2				4
COLEOPTERA	2	20	1	2	4	29
DIPTERA TOTAL	526	48	206	92	172	1044
DIPTERA:Ceratopogonidae	14	2	16	5	22	59
DIPTERA:Chironomidae	511	46	190	87	150	984
Subfam.–Tanypodinae	154	34	90	66	112	456
Subfam.–Prodiamesinae	1	1	11	1	10	24
Subfam.–Orthocladiinae	45	5	10	1	8	69
Subfam.–Chironominae	311	6	79	19	20	435
Tribe–Chironomini	244	5	11	19	14	293
Tribe–Tanytarsini	67	1	68		6	142
DIPTERA:Tipulidae	1					1
GASTROPODA	45	18	2	5	22	92
PELECYPODA	82	5	19	17	105	228
TOTAL INDIVIDUALS	1616	535	662	497	1025	4335

PINCHER LAKE OCT 27 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	2					2
OLIGOCHAETA	1	1	3	2	2	4
HIRUDINEA	1	2	1			2
AMPHIPODA	2	2	2	1	2	2
EPHEMEROPTERA	2	1	2	2	1	2
ODONATA	4	3	3	3	4	6
HEMIPTERA			2	1	1	3
MEGALOPTERA					1	1
TRICHOPTERA	3	2	6	5	4	10
COLEOPTERA	1		1	2		2
DIPTERA TOTAL	21	20	29	25	19	37
DIPTERA:Ceratopogonidae	1	3	4	4	2	6
DIPTERA:Chironomidae	20	17	24	21	17	30
Subfam.–Tanypodinae	4	4	4	5	3	5
Subfam.–Orthocladiinae	4	2	4	3	3	5
Subfam.–Chironominae	12	11	16	13	11	20
Tribe–Chironomini	10	9	13	10	8	16
Tribe–Tanytarsini	2	2	3	3	3	4
DIPTERA:Tabanidae			1			1
GASTROPODA	1			1		1
PELECYPODA	1	3		1	2	3
TOTAL SPECIES	39	34	49	43	36	75

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	3					3
OLIGOCHAETA	10	2	10	3	2	27
HIRUDINEA	1	2	1			4
AMPHIPODA	90	23	27	8	300	448
EPHEMEROPTERA	97	52	126	53	123	451
ODONATA	4	4	8	9	6	31
HEMIPTERA			2	1	3	6
MEGALOPTERA					1	1
TRICHOPTERA	3	2	27	30	9	71
COLEOPTERA	1		1	6		8
DIPTERA TOTAL	478	157	395	467	155	1652
DIPTERA:Ceratopogonidae	1	4	20	17	15	57
DIPTERA:Chironomidae	477	153	374	450	140	1594
Subfam.–Tanypodinae	117	58	81	171	18	445
Subfam.–Orthocladiinae	12	10	65	96	34	217
Subfam.–Chironominae	348	85	228	183	88	932
Tribe–Chironomini	310	43	142	122	81	698
Tribe–Tanytarsini	38	42	86	61	7	234
DIPTERA:Tabanidae			1			1
GASTROPODA	1			1		2
PELECYPODA	1	64		45	5	115
TOTAL INDIVIDUALS	689	306	597	623	604	2819

PLASTIC LAKE OCT 12 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA			1			1
OLIGOCHAETA	2	3	2	2	3	6
HIRUDINEA	1	1	2			3
AMPHIPODA	1	1		2	1	2
HYDRACARINA			1		1	1
EPHEMEROPTERA	3	1	1	2	1	3
ODONATA	8	6	5	6	7	13
TRICHOPTERA	5	5	8	8	9	14
LEPIDOPTERA					1	1
COLEOPTERA			1			1
DIPTERA TOTAL	32	27	33	30	31	46
DIPTERA:Ceratopogonidae	6	4	4	4	3	7
DIPTERA:Chironomidae	25	23	28	26	27	36
Subfam.-Tanypodinae	5	4	5	5	5	6
Subfam.-Orthocladiinae	6	5	6	5	5	7
Subfam.-Chironominae	14	14	17	16	17	23
Tribe-Chironomini	10	12	14	13	14	19
Tribe-Tanytarsini	4	2	3	3	3	4
DIPTERA:Tipulidae			1		1	2
DIPTERA:Misc.	1					1
GASTROPODA			1	1		1
PELECYPODA	3	5	4	4	2	6
TOTAL SPECIES	55	49	59	55	56	98

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA			1			1
OLIGOCHAETA	5	3	3	10	7	28
HIRUDINEA	1	1	6			8
AMPHIPODA	62	123		147	11	343
HYDRACARINA			1		1	2
EPHEMEROPTERA	37	21	30	107	68	263
ODONATA	16	22	12	47	21	118
TRICHOPTERA	24	25	16	17	31	113
LEPIDOPTERA					1	1
COLEOPTERA			1			1
DIPTERA TOTAL	269	451	495	370	640	2225
DIPTERA:Ceratopogonidae	8	11	18	23	10	70
DIPTERA:Chironomidae	260	440	475	347	629	2151
Subfam.-Tanypodinae	77	71	111	96	127	482
Subfam.-Orthocladiinae	53	62	41	79	146	381
Subfam.-Chironominae	130	307	323	172	356	1288
Tribe-Chironomini	114	276	232	109	154	885
Tribe-Tanytarsini	16	31	91	63	202	403
DIPTERA:Tipulidae			2		1	3
DIPTERA:Misc.	1					1
GASTROPODA			9	1		10
PELECYPODA	52	34	59	24	24	193
TOTAL INDIVIDUALS	466	680	633	723	804	3306

SKIDWAY LAKE OCT 20 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA	1	2			2	3
ISOPODA	1	1	1	1		1
AMPHIPODA	2	1	1	2	2	2
HYDRACARINA	1		1	1	2	2
EPHEMEROPTERA	3	3	2	4	2	4
ODONATA	8	9	11	10	9	15
HEMIPTERA	4	1	2	2	1	5
MEGALOPTERA	1	2	2	1		2
TRICHOPTERA	11	11	11	15	9	20
LEPIDOPTERA		1	1			1
COLEOPTERA	5	2	3		3	7
DIPTERA TOTAL	44	41	38	32	43	58
DIPTERA:Ceratopogonidae	4	5	3	3	5	7
DIPTERA:Chironomidae	37	36	34	28	38	47
Subfam.–Tanypodinae	7	6	6	6	7	7
Subfam.–Orthocladiinae	9	6	7	5	7	10
Subfam.–Chironominae	21	24	21	17	24	30
Tribe–Chironomini	18	21	19	16	21	27
Tribe–Tanytarsini	3	3	2	1	3	3
DIPTERA:Tabanidae				1		1
DIPTERA:Tipulidae	1					1
DIPTERA:Misc.	1		1			1
DIPTERA–indet./ter.forms	1					1
PELECYPODA		1		2		2
TOTAL SPECIES	81	75	73	70	73	122

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA	1	5			2	8
ISOPODA	24	75	15	1		115
AMPHIPODA	81	48	44	116	22	311
HYDRACARINA	1		1	1	2	5
EPHEMEROPTERA	440	199	200	251	492	1582
ODONATA	26	49	83	63	43	264
HEMIPTERA	17	2	2	4	1	26
MEGALOPTERA	3	3	3	3		12
TRICHOPTERA	106	91	91	119	89	496
LEPIDOPTERA		3	1			4
COLEOPTERA	12	5	4		6	27
DIPTERA TOTAL	1090	949	1158	874	1969	6040
DIPTERA:Ceratopogonidae	145	64	99	76	30	414
DIPTERA:Chironomidae	941	885	1058	797	1939	5620
Subfam.–Tanypodinae	199	160	216	156	225	956
Subfam.–Orthocladiinae	149	49	119	93	165	575
Subfam.–Chironominae	593	676	723	548	1549	4089
Tribe–Chironomini	527	634	701	527	1433	3822
Tribe–Tanytarsini	66	42	22	21	116	267
DIPTERA:Tabanidae				1		1
DIPTERA:Tipulidae	3					3
DIPTERA:Misc.	1		1			2
DIPTERA–indet./ter.forms	1					1
PELECYPODA		3		3		6
TOTAL INDIVIDUALS	1801	1432	1602	1435	2626	8896

WESTWARD LAKE OCT 19 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA	1				1	1
NEMATODA	1		1			1
OLIGOCHAETA	4	2	4	4	3	6
HIRUDINEA	1	3	2	1	1	6
AMPHIPODA	2	2	2	2	2	2
EPHEMEROPTERA	4	3	3	4	1	5
ODONATA	2				4	4
PLECOPTERA			1			1
HEMIPTERA	2	1		1		2
MEGALOPTERA			1			1
TRICHOPTERA	6	7	6	1		11
LEPIDOPTERA	1				1	1
COLEOPTERA	1	1	1	1	2	4
DIPTERA TOTAL	54	48	70	46	54	82
DIPTERA:Ceratopogonidae	4	2	8		5	9
DIPTERA:Chironomidae	21	17	32	17	20	43
Subfam.–Tanypodinae	5	5	4	4	5	7
Subfam.–Prodiamesinae	1		1	1		1
Subfam.–Orthocladiinae	4	5	6	1	3	10
Subfam.–Chironominae	11	7	21	11	12	25
Tribe–Chironomini	8	6	17	10	8	20
Tribe–Tanytarsini	3	1	4	1	4	5
DIPTERA:Misc.			2		1	3
DIPTERA–indet./ter.forms			1			1
GASTROPODA	1		1	1	1	2
PELECYPODA	2	2	2	1	2	5
TOTAL SPECIES	82	69	94	62	72	134

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA	1				7	8
NEMATODA	1		1			2
OLIGOCHAETA	38	7	15	10	19	89
HIRUDINEA	1	9	4	1	1	16
AMPHIPODA	219	130	35	248	680	1312
EPHEMEROPTERA	147	65	149	49	7	417
ODONATA	3				28	31
PLECOPTERA			2			2
HEMIPTERA	3	2		2		7
MEGALOPTERA			1			1
TRICHOPTERA	9	15	13	1		38
LEPIDOPTERA	1				2	3
COLEOPTERA	3	3	1	3	15	25
DIPTERA TOTAL	239	258	297	48	321	1163
DIPTERA:Ceratopogonidae	11	2	18		93	124
DIPTERA:Chironomidae	228	256	269	48	223	1024
Subfam.–Tanypodinae	61	74	83	9	35	262
Subfam.–Prodiamesinae	2		1	2		5
Subfam.–Orthocladiinae	9	15	12	1	4	41
Subfam.–Chironominae	156	167	173	36	184	716
Tribe–Chironomini	101	115	84	29	47	376
Tribe–Tanytarsini	55	52	89	7	137	340
DIPTERA:Misc.			2		5	7
DIPTERA–indet./ter.forms			8			8
GASTROPODA	1		1	1	2	5
PELECYPODA	3	2	56	6	150	217
TOTAL INDIVIDUALS	669	491	575	369	1232	3336

YOUNG LAKE OCT 20 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA		1	2			2
OLIGOCHAETA	2	3	3	2	2	5
HIRUDINEA	3			3		4
AMPHIPODA	2	1	1	2	1	2
DECAPODA				1		1
HYDRACARINA			1			1
EPHEMEROPTERA	3	2	3	5	6	8
ODONATA	6	2	2	2	3	8
PLECOPTERA	1					1
MEGALOPTERA	1					1
TRICHOPTERA	10	4	7	4	2	12
LEPIDOPTERA			1			1
COLEOPTERA			2	4	1	5
DIPTERA TOTAL	23	17	17	24	11	43
DIPTERA:Ceratopogonidae	1	1	2	2	1	5
DIPTERA:Chironomidae	21	16	15	21	10	36
Subfam.–Tanypodinae	6	4	5	5	4	6
Subfam.–Diamesinae		1	1			1
Subfam.–Prodiamesinae		1	1			1
Subfam.–Orthocladiinae		1	1	2	1	4
Subfam.–Chironominae	15	9	7	14	5	24
Tribe–Chironomini	13	8	5	11	5	20
Tribe–Tanytarsini	2	1	2	3		4
DIPTERA:Tabanidae	1					1
DIPTERA:Tipulidae				1		1
GASTROPODA	5	4	2	1	1	5
PELECYPODA	2	2	2		1	3
TOTAL SPECIES	58	36	43	48	28	102

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA		1	3			4
OLIGOCHAETA	2	5	4	6	6	23
HIRUDINEA	3			6		9
AMPHIPODA	532	153	270	873	152	1980
DECAPODA				1		1
HYDRACARINA			1			1
EPHEMEROPTERA	28	5	5	55	25	118
ODONATA	31	3	8	8	17	67
PLECOPTERA	1					1
MEGALOPTERA	1					1
TRICHOPTERA	28	9	7	6	2	52
LEPIDOPTERA			2			2
COLEOPTERA			2	7	2	11
DIPTERA TOTAL	165	115	110	209	50	649
DIPTERA:Ceratopogonidae	3	5	8	4	1	21
DIPTERA:Chironomidae	161	110	102	203	49	625
Subfam.–Tanypodinae	111	46	66	62	42	327
Subfam.–Diamesinae		2	1			3
Subfam.–Prodiamesinae		2	1			3
Subfam.–Orthocladiinae		1	1	2	1	5
Subfam.–Chironominae	50	59	33	139	6	287
Tribe–Chironomini	45	56	16	108	6	231
Tribe–Tanytarsini	5	3	17	31		56
DIPTERA:Tabanidae	1					1
DIPTERA:Tipulidae				2		2
GASTROPODA	50	10	27	2	7	96
PELECYPODA	150	8	57		16	231
TOTAL INDIVIDUALS	991	309	496	1173	277	3246

APPENDIX 7

SPRING AND FALL COMPARISON OF THE NUMBER OF INDIVIDUALS FOR EACH LAKE

Blue Chalk Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
NEMATODA	2	5	2			7	3	1		1	7	14	0.4	0.4
OLIGOCHAETA	5	26	8		6		10	10	4	6	33	42	2.0	1.2
HIRUDINEA					1					1	1	1	0.1	
AMPHIPODA	120	615	142	119	128	172	91	61	115	374	596	1341	37.0	37.6
DECAPODA				1								1		
HYDRACARINA			1		1				1		3		0.2	
COLLEMBOLA			1								1		0.1	
EPHEMEROPTERA	7	153	58	176	12	106	28	45	45	118	150	598	9.3	16.8
ODONATA	6	22	12	5	7	18	2		6	38	33	83	2.0	2.3
PLECOPTERA										1		1		
HEMIPTERA			1								1		0.1	
MEGALOPTERA					2						2		0.1	
TRICHOPTERA	5	25	6	9	4	5	2	9	2	28	19	76	1.2	2.1
LEPIDOPTERA		2							1		1	2	0.1	0.1
COLEOPTERA	4	40	9	4	4	6	8	10	12	18	37	78	2.3	2.2
DIPTERA TOTAL	209	320	177	126	102	424	131	206	85	229	704	1305	43.7	36.7
DIPTERA:Ceratopogonidae	23	11	2	3	9	7	32	20	35	21	101	62	14.3	4.8
DIPTERA:Chironomidae	186	308	175	123	93	417	99	186	48	198	601	1232	85.4	93.7
Subfam.–Podonominae										1		1		0.1
Subfam.–Tanypodinae	124	166	134	67	73	153	77	93	27	65	435	544	72.4	44.2
Subfam.–Prodiamesinae									1	3	1	3	0.2	0.2
Subfam.–Orthocladiinae	14	56	14	12	4	18	10	13	5	44	47	143	7.8	11.6
Subfam.–Chironominae	48	86	27	44	16	246	12	80	15	85	118	541	19.6	43.9
Tribe–Chironomini	22	58	10	43	12	142	5	61	7	42	56	346	47.5	64.0
Tribe–Tanytarsini	26	28	17	1	4	104	7	19	8	43	62	195	52.5	36.0
DIPTERA:Tabanidae									1		1		0.1	
DIPTERA:Tipulidae									1	8	1	8	0.1	0.6
DIPTERA:Misc.		1								2		3		0.2
GASTROPODA		1			1	1				1	1	3	0.1	0.1
PELECYPODA	4	2	4	1	2	5	5		6		21	8	1.3	0.2
TOTAL INDIVIDUALS	362	1211	421	441	270	744	280	342	277	815	1610	3553	100	100

Clear Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
TURBELLARIA			1								1			
NEMATODA	1		1		1		1	5	2		6	5	0.3	0.2
OLIGOCHAETA	16	6	8	6	10	12	32	48	9	14	75	86	3.6	3.0
HIRUDINEA		1			3	2	1				4	3	0.2	0.1
AMPHIPODA	79	149	38	22	35	325	19	490	15	70	186	1056	9.0	37.0
DECAPODA					1						1			
EPHEMEROPTERA	184	28	63	23	110	21	66	277	107	192	530	541	25.5	19.0
ODONATA	3	9		1	3	1		22	5	22	11	55	0.5	1.9
HEMIPTERA								3				3		0.1
MEGALOPTERA		3							4	22	4	25	0.2	0.9
TRICHOPTERA	5	7	6	38	8	4	2	28	7	13	28	90	1.3	3.2
LEPIDOPTERA			1		5			3			6	3	0.3	0.1
COLEOPTERA	3	1	70		13	20	1	4	1		88	25	4.2	0.9
DIPTERA TOTAL	194	128	537	52	127	195	46	284	128	213	1032	872	49.7	30.6
DIPTERA:Ceratopogonidae	5	2	6		2	21	5	55	8	2	26	80	2.5	9.2
DIPTERA:Chironomidae	189	126	530	51	125	174	41	229	120	210	1005	790	97.4	90.6
Subfam.–Podonominae						1						1		0.1
Subfam.–Tanypodinae	57	11	8	8	24	15	1	60	28	57	118	151	11.7	19.1
Subfam.–Prodiamesinae				7		8	1	3			1	18	0.1	2.3
Subfam.–Orthocladiinae	55	2	175	5	40	1	23	22	33	24	326	54	32.4	6.8
Subfam.–Chironominae	77	113	347	31	61	149	16	144	59	129	560	566	55.7	71.6
Tribe–Chironomini	37	61	17	31	42	149	11	131	39	122	146	494	26.1	87.3
Tribe–Tanytarsini	40	52	330		19		5	13	20	7	414	72	73.9	12.7
DIPTERA:Tipulidae										1		1		0.11
DIPTERA:Misc.			1	1							1	1	0.10	0.11
GASTROPODA		1	6			1					6	2	0.29	0.07
PELECYPODA		4	93	7	1	10	4	59		5	98	85	4.72	2.98
TOTAL INDIVIDUALS	485	337	824	149	317	591	172	1223	278	551	2076	2851	100	100

Cradle Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
OLIGOCHAETA		8		3	8	8	2		6	2	16	21	0.7	0.7
HIRUDINEA				1		1		1	2	2	2	5	0.1	0.2
AMPHIPODA	46	315	20	19	6	194	34	25	270	502	376	1055	15.5	33.1
DECAPODA		1								1		2		0.1
HYDRACARINA									1		1			
COLLEMBOLA	1						2				3		0.1	
EPHEMEROPTERA	28	35	9	84	36	84	48	16	358	136	479	355	19.8	11.1
ODONATA	1	2	9	2		2	2	7	38	13	50	26	2.1	0.8
HEMIPTERA	4	1	2	1	6		5	2	4		21	4	0.9	0.1
NEUROPTERA					1						1			
TRICHOPTERA	14	1	8	10		13	3	7	28	5	53.	36	2.2	1.1
LEPIDOPTERA										2		2		0.1
COLEOPTERA				1	1	6	4	1	8	1	13	9	0.5	0.3
DIPTERA TOTAL	491	83	377	128	26	275	151	834	317	326	1362	1646	56.3	51.6
DIPTERA:Ceratopogonidae	4		8	8	8	7	13	1	20	3	53	19	3.9	1.2
DIPTERA:Chironomidae	486	83	369	120	18	268	136	833	296	323	1305	1627	95.8	98.8
Subfam.–Tanypodinae	191	18	162	27	5	43	35	114	100	20	493	222	37.8	13.6
Subfam.–Prodiamesinae						1						1		0.1
Subfam.–Orthocladiinae	8	35	2	28	1	32	3	4	12	41	26	140	2.0	8.6
Subfam.–Chironominae	287	30	205	65	12	192	98	715	184	262	786	1264	60.2	77.7
Tribe–Chironomini	210	25	150	53	10	180	72	559	138	65	580	882	73.8	69.8
Tribe–Tanytarsini	77	5	55	12	2	12	26	156	46	197	206	382	26.2	30.2
DIPTERA:Misc.	1						2		1		4		0.3	
GASTROPODA						2			1	1	1	3		0.1
PELECYPODA	6	1	9	2	10	9	9	13	9	1	43	26	1.8	0.8
TOTAL INDIVIDUALS	591	447	434	251	94	594	260	906	1042	992	2421	3190	100	100

Crosson Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
TURBELLARIA		1										1		
NEMATODA				1				1				2		
OLIGOCHAETA	2	13	13	6	11	4	5		10		41	23	4.6	0.5
HIRUDINEA			1	1	3	6	2	1	6		12	8	1.3	0.2
AMPHIPODA	2	870	53	239	15	366	7	78	20	258	97	1811	10.9	36.8
HYDRACARINA	1				7	1			1		9	1	1.0	
EPHEMEROPTERA	4	112	79	347	42	191	63	104	222	51	410	805	46.0	16.4
ODONATA	2	115	2	62	6	98	3	22	20	27	33	324	3.7	6.6
HEMIPTERA					1	1	3		1		5	1	0.6	
MEGALOPTERA		1	3	6					1		4	7	0.4	0.1
TRICHOPTERA	1	28	3	18	3	26	5	7	6	63	18	142	2.0	2.9
LEPIDOPTERA			1		3						4		0.4	
COLEOPTERA		52	6	50	1	1		4	10	5	17	112	1.9	2.3
DIPTERA TOTAL	23	402	31	341	66	608	33	54	74	222	227	1627	25.5	33.1
DIPTERA:Ceratopogonidae	1	9	1	8	17	17	1	1	2		22	35	9.7	2.2
DIPTERA:Chironomidae	22	393	30	333	49	591	32	53	70	222	203	1592	89.4	97.8
Subfam.–Podonominae				1								1		0.1
Subfam.–Tanypodinae	3	178	6	113	11	346	1	28	16	64	37	729	18.2	45.8
Subfam.–Orthocladiinae	14	55	5	122	11	55	2		12	4	44	236	21.7	14.8
Subfam.–Chironominae	5	160	19	97	27	190	29	25	42	154	122	626	60.1	39.3
Tribe–Chironomini	2	63	17	56	27	80	29	22	33	130	108	351	88.5	56.1
Tribe–Tanytarsini	3	97	2	41		110		3	9	24	14	275	11.5	43.9
DIPTERA:Tipulidae									2		2		0.9	
GASTROPODA		25						1		21		47		1.0
PELECYPODA		1	1		1		1	1	11	2	14	4	1.6	0.1
TOTAL INDIVIDUALS	35	1620	193	1071	159	1302	122	273	382	649	891	4915	100	100

Delano Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total Spring	Total Fall	% Spring	% Fall
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f				
TURBELLARIA	3								1		4		0.1	
NEMATODA	2	1			1		1				4	1	0.1	
OLIGOCHAETA	11	3			1	2	9		5	3	26	8	0.9	0.4
HIRUDINEA	1	1	4					2			5	3	0.2	0.1
AMPHIPODA	208	303	38	267	35	43	11	13	138	57	430	683	14.6	31.2
HYDRACARINA	14		10		6		18		2		50		1.7	
COLLEMBOLA	1										1			
EPHEMEROPTERA	104	157	46	246	77	163	255	145	98	57	580	768	19.7	35.1
ODONATA	37	28	6	53	13	15	17	14	32	26	105	136	3.6	6.2
HEMIPTERA				1			5				5	1	0.2	
MEGALOPTERA								1				1		
TRICHOPTERA	8	1	2	17	3	4	37	9	14	7	64	38	2.2	1.7
COLEOPTERA	49	5	17	4	31		33	9	9		139	18	4.7	0.8
DIPTERA TOTAL	384	59	161	88	189	125	490	195	252	32	1476	499	50.2	22.8
DIPTERA:Ceratopogonidae	3	1	1	1	9	7	13	4	2	1	28	14	1.9	2.8
DIPTERA:Chironomidae	380	58	158	87	180	118	476	191	250	31	1444	485	97.8	97.2
Subfam.–Tanypodinae	160	28	33	44	50	64	136	74	135	8	514	218	35.6	44.9
Subfam.–Orthocladiinae	60	4	12	8	29	8	58	6	28		187	26	13.0	5.4
Subfam.–Chironominae	160	26	113	35	101	46	282	111	87	23	743	241	51.5	49.7
Tribe–Chironomini	90	20	86	25	63	40	221	74	48	16	508	175	68.4	72.6
Tribe–Tanytarsini	70	6	27	10	38	6	61	37	39	7	235	66	31.6	27.4
DIPTERA:Tabanidae			1								1		0.1	
DIPTERA:Misc.	1		1				1				3		0.2	
GASTROPODA	9		4	1	1		21		3	1	38	2	1.3	0.1
PELECYPODA	4	5		12		12	5	2	4		13	31	0.4	1.4
TOTAL INDIVIDUALS	835	563	288	689	357	364	902	390	558	183	2940	2189	100	100

Hamer Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
TURBELLARIA										1		1		0.01
NEMATODA							2				2		0.09	
OLIGOCHAETA	1	7	1	30	15	8	11	5	1	14	29	64	1.26	0.81
HIRUDINEA		1		1								2		0.03
AMPHIPODA	4	69	8	513	39	1045	13	1365	95	625	159	3617	6.92	45.65
HYDRACARINA	4	5	8	3		9	2	8	1	16	15	41	0.65	0.52
EPHEMEROPTERA	129	82	29	656	348	408	115	165	93	361	714	1672	31.06	21.10
ODONATA	30	12	13	83	28	58	24	76	4	85	99	314	4.31	3.96
HEMIPTERA	7				2		3				12		0.52	
MEGALOPTERA	3		2	1	11	1			19		35	2	1.52	0.03
TRICHOPTERA	10	31	11	151	27	88	55	32	27	104	130	406	5.65	5.12
COLEOPTERA	2		1			1		3	1		4	4	0.17	0.05
DIPTERA TOTAL	111	129	147	362	112	284	409	458	236	288	1015	1521	44.15	19.20
DIPTERA:Ceratopogonidae	21	19	41	23	10	201	33	113	49	33	154	389	15.17	25.58
DIPTERA:Chironomidae	90	109	103	339	97	83	375	344	186	254	851	1129	83.84	74.23
Subfam.–Tanypodinae	35	28	36	139	43	45	117	152	70	111	301	475	35.37	42.07
Subfam.–Orthocladiinae	33	8	22	143	38	16	130	71	58	81	281	319	33.02	28.26
Subfam.–Chironominae	22	73	45	57	16	22	128	121	58	62	269	335	31.61	29.67
Tribe–Chironomini	21	73	43	50	16	20	106	105	49	58	235	306	87.36	91.34
Tribe–Tanytarsini	1		2	7		2	22	16	9	4	34	29	12.64	8.66
DIPTERA:Tabanidae					1					1	1	1	0.10	0.07
DIPTERA:Tipulidae		1	3		4		1				8	1	0.79	0.07
DIPTERA:Misc.								1	1		1	1	0.10	0.07
GASTROPODA		3		3		2				1		9		0.11
PELECYPODA	4	7	12	52	30	157	33	37	6	17	85	270	3.70	3.41
TOTAL INDIVIDUALS	305	346	232	1855	612	2061	667	2149	483	1512	2299	7923	100	100

Harp Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total Spring	Total Fall	% Spring	% Fall
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f				
TURBELLARIA		1		17		5		1		3		27		0.6
NEMATODA	2		1						1		4		0.2	
OLIGOCHAETA	32	19	16	5	4	18	8	8	21	11	81	61	3.6	1.4
HIRUDINEA			1	1			2	2			3	3	0.1	0.1
AMPHIPODA	140	700	47	327	88	351	300	161	55	556	630	2095	27.7	48.3
HYDRACARINA	11		1				2		10		24		1.1	
EPHEMEROPTERA	94	57	30	54	18	12	48	159	52	42	242	324	10.6	7.5
ODONATA	37	164	9	31	5	24	30	30	6	97	87	346	3.8	8.0
PLECOPTERA			1			1	1		2		4	1	0.2	
HEMIPTERA	1		1						4	1	6	1	0.3	
MEGALOPTERA		2						1	1		1	3		0.1
TRICHOPTERA	4	16	8	7	3	23	9	19	5	12	29	77	1.3	1.8
LEPIDOPTERA		2		2					1		1	4		0.1
COLEOPTERA	7	2	2	20	4	1	11	2	1	4	25	29	1.1	0.7
DIPTERA TOTAL	510	526	126	48	105	206	162	92	136	172	1039	1044	45.6	24.1
DIPTERA:Ceratopogonidae	20	14	23	2	13	16	24	5	29	22	109	59	10.5	5.7
DIPTERA:Chironomidae	490	511	101	46	92	190	135	87	99	150	917	984	88.3	94.3
Subfam.-Podonominae									4		4		0.4	
Subfam.-Tanypodinae	209	154	47	34	68	90	97	66	40	112	461	456	50.3	46.3
Subfam.-Prodiamesinae		1		1		11		1	3	10	3	24	0.3	2.4
Subfam.-Orthocladiinae	109	45	20	5	11	10	12	1	32	8	184	69	20.1	7.0
Subfam.-Chironominae	172	311	34	6	13	79	26	19	20	20	265	435	28.9	44.2
Tribe-Chironomini	158	244	33	5	7	11	20	19	14	14	232	293	87.5	67.4
Tribe-Tanytarsini	14	67	1	1	6	68	6		6	6	33	142	12.5	32.6
DIPTERA:Tipulidae		1	1				2		8		11	1	1.1	0.1
DIPTERA:Misc.			1				1				2		0.2	
GASTROPODA	12	45	15	18	2	2	4	5	1	22	34	92	1.5	2.1
PELECYPODA	19	82	15	5	7	19	14	17	13	105	68	228	3.0	5.3
TOTAL INDIVIDUALS	869	1616	273	535	236	662	591	497	309	1025	2278	4335	100	100

Pincher Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total Spring	Total Fall	% Spring	% Fall
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f				
NEMATODA	2	3									2	3	0.1	0.1
OLIGOCHAETA	24	10	5	2	12	10	7	3	10	2	58	27	1.8	1.0
HIRUDINEA	3	1		2	1	1	1		4		9	4	0.3	0.1
AMPHIPODA	54	90	66	23	36	27	12	8	139	300	307	448	9.8	15.9
COLLEMBOLA			1								1			
EPHEMEROPTERA	67	97	56	52	117	126	129	53	180	123	549	451	17.5	16.0
ODONATA	4	4	4	4	7	8	11	9	7	6	33	31	1.1	1.1
HEMIPTERA	5		1		1	2	6	1	2	3	15	6	0.5	0.2
MEGALOPTERA	1									1	1	1		
TRICHOPTERA	40	3	10	2	18	27	18	30	11	9	97	71	3.1	2.5
LEPIDOPTERA			1								1			
COLEOPTERA	9	1			8	1	1	6	1		19	8	0.6	0.3
DIPTERA TOTAL	614	478	627	157	340	395	246	467	138	155	1965	1652	62.6	58.6
DIPTERA:Ceratopogonidae	14	1	26	4	19	20	15	17	12	15	86	57	4.4	3.5
DIPTERA:Chironomidae	599	477	601	153	321	374	230	450	117	140	1868	1594	95.1	96.5
Subfam.–Tanypodinae	82	117	157	58	43	81	77	171	13	18	372	445	19.9	27.9
Subfam.–Orthocladiinae	24	12	23	10	33	65	33	96	25	34	138	217	7.4	13.6
Subfam.–Chironominae	493	348	421	85	245	228	120	183	79	88	1358	932	72.7	58.5
Tribe–Chironomini	161	310	248	43	117	142	78	122	38	81	642	698	47.3	74.9
Tribe–Tanytarsini	332	38	173	42	128	86	42	61	41	7	716	234	52.7	25.1
DIPTERA:Tabanidae						1	1				1	1	0.1	0.1
DIPTERA:Misc.	1								9		10		0.5	
GASTROPODA		1						1				2		0.1
PELECYPODA	46	1	13	64	1		9	45	11	5	80	115	2.6	4.1
TOTAL INDIVIDUALS	869	689	784	306	541	597	440	623	503	604	3137	2819	100	100

Plastic Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total Spring	Total Fall	% Spring	% Fall
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f				
NEMATODA						1						1		
OLIGOCHAETA	19	5	8	3	2	3	19	10	9	7	57	28	5.5	0.8
HIRUDINEA		1	2	1		6	1				3	8	0.3	0.2
AMPHIPODA	31	62	11	123	1		52	147	4	11	99	343	9.5	10.4
HYDRACARINA						1				1		2		0.1
COLLEMBOLA					1						1		0.1	
EPHEMEROPTERA	31	37	14	21	10	30	31	107	3	68	89	263	8.5	8.0
ODONATA	6	16	3	22	2	12	8	47	2	21	21	118	2.0	3.6
HEMIPTERA							3		1		4		0.4	
MEGALOPTERA							4		1		5		0.5	
TRICHOPTERA	7	24	11	25	5	16	3	17	3	31	29	113	2.8	3.4
LEPIDOPTERA									1	1	1	1	0.1	
COLEOPTERA					2	1	1		3		6	1	0.6	
DIPTERA TOTAL	221	269	111	451	87	495	136	370	107	640	662	2225	63.4	67.3
DIPTERA:Ceratopogonidae	24	8	9	11	4	18	17	23	23	10	77	70	11.6	3.1
DIPTERA:Chironomidae	192	260	99	440	83	475	114	347	65	629	553	2151	83.5	96.7
Subfam.–Podonominae									2		2		0.4	
Subfam.–Tanypodinae	34	77	26	71	19	111	34	96	6	127	119	482	21.5	22.4
Subfam.–Orthocladiinae	104	53	16	62	28	41	49	79	50	146	247	381	44.7	17.7
Subfam.–Chironominae	54	130	57	307	36	323	31	172	7	356	185	1288	33.5	59.9
Tribe–Chironomini	26	114	48	276	26	232	20	109	4	154	124	885	-67.0	68.7
Tribe–Tanytarsini	28	16	9	31	10	91	11	63	3	202	61	403	33.0	31.3
DIPTERA:Misc.		1	3				5		10		18	1	2.7	
GASTROPODA			1			9		1			1	10	0.1	0.3
PELECYPODA	13	52	12	34	6	59	32	24	3	24	66	193	6.3	5.8
TOTAL INDIVIDUALS	328	466	173	680	116	633	290	723	137	804	1044	3306	100	100

Skidway Lake 1988 Spring and Fall Comparison of Number of Individuals

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total Spring	Total Fall	% Spring	% Fall
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f				
OLIGOCHAETA	3	1	9	5	1		4		1	2	18	8	0.9	0.1
HIRUDINEA			2								2		0.1	
ISOPODA		24	21	75	3	15		1	13		37	115	1.8	1.3
AMPHIPODA	42	81	24	48	14	44	39	116	86	22	205	311	10.0	3.5
HYDRACARINA		1	1		1	1		1	2	2	4	5	0.2	0.1
EPHEMEROPTERA	138	440	46	199	83	200	108	251	53	492	428	1582	20.8	17.8
ODONATA	10	26	26	49	20	83	26	63	1	43	83	264	4.0	3.0
HEMIPTERA		17		2	1	2	3	4	3	1	7	26	0.3	0.3
MEGALOPTERA	1	3	5	3	8	3	8	3	5		27	12	1.3	0.1
TRICHOPTERA	19	106	17	91	23	91	15	119	13	89	87	496	4.2	5.6
LEPIDOPTERA				3		1						4		
COLEOPTERA	4	12		5	3	4				6	7	27	0.3	0.3
DIPTERA TOTAL	184	1090	327	949	239	1158	272	874	91	1969	1113	6040	54.2	67.9
DIPTERA:Ceratopogonidae	17	145	9	64	18	99	33	76	14	30	91	414	8.2	6.9
DIPTERA:Chironomidae	167	941	318	885	221	1058	237	797	77	1939	1020	5620	91.6	93.0
Subfam.–Tanypodinae	52	199	15	160	50	216	43	156	9	225	169	956	16.6	17.0
Subfam.–Orthocladiinae	28	149	16	49	75	119	19	93	11	165	149	575	14.6	10.2
Subfam.–Chironominae	87	593	287	676	96	723	175	548	57	1549	702	4089	68.8	72.8
Tribe–Chironomini	82	527	263	634	68	701	155	527	42	1433	610	3822	86.9	93.5
Tribe–Tanytarsini	5	66	24	42	28	22	20	21	15	116	92	267	13.1	6.5
DIPTERA:Tabanidae							1	1			1	1	0.1	
DIPTERA:Tipulidae		3										3		
DIPTERA:Misc.		1				1	1				1	2	0.1	
–indet./terrestrial forms		1										1		
PELECYPODA			18	3	17			3			35	6	1.7	0.1
TOTAL INDIVIDUALS	401	1801	496	1432	413	1602	475	1435	268	2626	2053	8896	100	100

Westward Lake 1988 Spring and Fall Comparison of Number of Individuals

TAXONOMIC NAME	Site Data for Spring and Fall s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
TURBELLARIA		1								7		8		0.2
NEMATODA		1			1	1			1		2	2	0.1	0.1
OLIGOCHAETA	1	38	5	7	7	15	5	10	16	19	34	89	1.8	2.7
HIRUDINEA	3	1	1	9		4		1	1	1	5	16	0.3	0.5
AMPHIPODA	40	219	292	130	110	35	102	248	106	680	650	1312	34.2	39.3
DECAPODA	1										1		0.1	
HYDRACARINA	1				1						2		0.1	
COLLEMBOLA					1						1		0.1	
EPHEMEROPTERA	85	147	180	65	98	149	96	49	22	7	481	417	25.3	12.5
ODONATA	1	3			1				3	28	5	31	0.3	0.9
PLECOPTERA						2						2		0.1
HEMIPTERA		3	1	2	1		2	2			4	7	0.2	0.2
MEGALOPTERA						1						1		0.0
TRICHOPTERA	1	9	5	15	19	13	1	1			26	38	1.4	1.1
LEPIDOPTERA		1			1				2	2	3	3	0.2	0.1
COLEOPTERA	12	3	13	3	9	1	1	3	1	15	36	25	1.9	0.7
DIPTERA TOTAL	86	239	46	258	218	297	39	48	116	321	505	1163	26.6	34.9
DIPTERA:Ceratopogonidae	4	11	2	2	5	18	1		41	93	53	124	10.4	10.7
DIPTERA:Chironomidae	82	228	42	256	212	269	38	48	73	223	447	1024	87.5	88.0
Subfam.–Tanypodinae	36	61	3	74	62	83	13	9	12	35	126	262	28.2	25.6
Subfam.–Prodiamesinae		2				1	2	2	2		4	5	0.9	0.5
Subfam.–Orthocladiinae	5	9	10	15	14	12	5	1	8	4	42	41	9.4	4.0
Subfam.–Chironominae	41	156	29	167	136	173	18	36	51	184	275	716	61.5	69.9
Tribe–Chironomini	23	101	14	115	65	84	14	29	7	47	123	376	44.7	52.5
Tribe–Tanytarsini	18	55	15	52	71	89	4	7	44	137	152	340	55.3	47.5
DIPTERA:Misc.			1		1	2			2	5	4	7	0.8	0.6
–indet./terrestrial forms			1			8					1	8	1.4	0.7
GASTROPODA		1			1	1		1	1	2	2	5	0.1	0.1
PELECYPODA	20	3	22	2	5	56	8	6	89	150	144	217	7.6	6.5
TOTAL INDIVIDUALS	251	669	565	491	473	575	254	369	358	1232	1901	3336	100	100

Young Lake 1988 Spring and Fall Comparison of Number of Individuals

TAXONOMIC NAME	Site Data for Spring and Fall s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
NEMATODA				1		3						4		0.1
OLIGOCHAETA	26	2		5	2	4	3	6		6	31	23	2.1	0.7
HIRUDINEA		3						6				9		0.3
AMPHIPODA	34	532	49	153	77	270	218	873	61	152	439	1980	29.0	61.0
DECAPODA								1	1		1	1	0.1	
HYDRACARINA	1					1	1				2	1	0.1	
EPHEMEROPTERA	73	28	36	5	19	5	46	55	56	25	230	118	15.2	3.6
ODONATA	6	31		3		8	26	8	8	17	40	67	2.6	2.1
PLECOPTERA	15	1									15	1	1.0	
MEGALOPTERA	4	1									4	1	0.3	
TRICHOPTERA	18	28		9	2	7	10	6	5	2	35	52	2.3	1.6
LEPIDOPTERA						2						2		0.1
COLEOPTERA	2		4		1	2	5	7	13	2	25	11	1.7	0.3
DIPTERA TOTAL	229	215	34	125	45	137	289	211	60	57	657	745	43.5	23.0
DIPTERA:Ceratopogonidae	22	3		5	5	8	7	4	2	1	36	21	5.5	2.8
DIPTERA:Chironomidae	203	161	34	110	40	102	282	203	58	49	617	625	93.9	83.9
Subfam.–Tanypodinae	93	111	9	46	5	66	124	62	18	42	249	327	40.4	52.3
Subfam.–Diamesinae	1			2		1					1	3	0.2	0.5
Subfam.–Prodiamesinae				2		1						3		0.5
Subfam.–Orthocladiinae	52		20	1	31	1	51	2	33	1	187	5	30.3	0.8
Subfam.–Chironominae	57	50	5	59	4	33	107	139	7	6	180	287	29.2	45.9
Tribe–Chironomini	48	45	2	56	4	16	17	108	5	6	76	231	42.2	80.5
Tribe–Tanytarsini	9	5	3	3		17	90	31	2		104	56	57.8	19.5
DIPTERA:Tabanidae		1										1		0.1
DIPTERA:Tipulidae								2				2		0.3
DIPTERA:Misc.	4										4		0.6	
–indet./terrestrial forms		50		10		27		2		7		96		12.9
GASTROPODA	4		1		2		14				21		1.4	
PELECYPODA	4	150	1	8	2	57	4		1	16	12	231	0.8	7.1
TOTAL INDIVIDUALS	416	991	125	309	150	496	616	1173	205	277	1512	3246	100	100

APPENDIX 8

SPRING AND FALL COMPARISON OF THE NUMBER OF SPECIES FOR EACH LAKE

Blue Chalk Lake 1988 Spring and Fall Comparison of Number of Species

TAXONOMIC NAME	Site Data for Spring and Fall s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
NEMATODA	1	2	1			2	2	1		1	2	2	2.2	1.8
OLIGOCHAETA	5	3	5		1		3	3	2	3	7	4	7.6	3.6
HIRUDINEA					1					1	1	1	1.1	0.9
AMPHIPODA	1	1	1	1	2	1	2	1	1	2	2	2	2.2	1.8
DECAPODA				1								1		0.9
HYDRACARINA			1		1				1		1		1.1	
COLLEMBOLA			1								1		1.1	
EPHEMEROPTERA	3	5	6	5	3	4	5	5	4	5	7	8	7.6	7.1
ODONATA	2	4	4	4	2	5	2		2	5	6	9	6.5	8.0
PLECOPTERA										1		1		0.9
HEMIPTERA			1								1		1.1	
MEGALOPTERA					1						1		1.1	
TRICHOPTERA	5	9	4	5	4	3	2	5	2	6	11	12	12.0	10.7
LEPIDOPTERA		1							1		1	1	1.1	0.9
COLEOPTERA	3	3	3	2	1	1	2	2	2	1	3	5	3.3	4.5
DIPTERA TOTAL	26	38	23	26	17	24	17	25	18	39	45	61	48.9	54.5
DIPTERA:Ceratopogonidae	2	4	1	1	2	1	4	3	2	7	5	11	11.1	18.0
DIPTERA:Chironomidae	24	33	22	25	15	23	13	22	14	30	38	48	84.4	78.7
Subfam.–Podonominae										1		1		2.1
Subfam.–Tanypodinae	5	8	6	7	6	5	5	5	5	6	8	8	21.1	16.7
Subfam.–Prodiamesinae									1	1	1	1	2.6	2.1
Subfam.–Orthocladiinae	5	7	6	5	2	6	3	4	3	6	10	12	26.3	25.0
Subfam.–Chironominae	14	18	10	13	7	12	5	13	5	16	19	26	50.0	54.2
Tribe–Chironomini	8	14	7	12	5	10	2	10	3	12	13	22	68.4	84.6
Tribe–Tanytarsini	6	4	3	1	2	2	3	3	2	4	6	4	31.6	15.4
DIPTERA:Tabanidae									1		1		2.2	
DIPTERA:Tipulidae									1	1	1	1	2.2	1.6
DIPTERA:Misc.		1								1		1		1.6
GASTROPODA		1			1	1				1	1	3	1.1	2.7
PELECYPODA	1	1	1	1	1	2	1		1		2	2	2.2	1.8
TOTAL SPECIES	47	68	51	45	35	43	36	42	34	65	92	112	100	100

Clear Lake 1988 Spring and Fall Comparison of Number of Species

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total Spring	Total Fall	% Spring	% Fall
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f				
TURBELLARIA			1								1		1.1	
NEMATODA	1		1		1		1	2	1		1	2	1.1	2.0
OLIGOCHAETA	3	3	2	3	1	1	3	3	2	3	4	4	4.3	4.0
HIRUDINEA		1			1	2	1				2	2	2.1	2.0
AMPH	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2.0
DECAPODA					1						1		1.1	
EPHEMEROPTERA	3	4	3	3	3	4	4	3	5	4	6	5	6.4	5.0
ODONATA	2	4		1	2	1		3	3	7	6	10	6.4	9.9
HEMIPTERA								1				1		1.0
MEGALOPTERA		1							1	1	1	1	1.1	1.0
TRICHOPTERA	2	4	3	5	5	2	2	11	4	3	10	13	10.6	12.9
LEPIDOPTERA			1		1			1			2	1	2.1	1.0
COLEOPTERA	3	1	1		2	1	1	2	1		5	3	5.3	3.0
DIPTERA TOTAL	28	16	24	11	25	22	19	30	25	23	50	51	53.2	50.5
DIPTERA:Ceratopogonidae	3	1	4		2	5	5	5	3	2	9	8	18.0	15.7
DIPTERA:Chironomidae	25	15	19	10	23	17	14	25	22	20	40	41	80.0	80.4
Subfam.–Podonominae						1						1		2.4
Subfam.–Tanypodinae	5	4	4	4	5	4	1	3	5	4	6	7	15.0	17.1
Subfam.–Prodiamesinae				1		1	1	1			1	1	2.5	2.4
Subfam.–Orthocladiinae	6	2	6	2	5	1	4	7	5	7	9	8	22.5	19.5
Subfam.–Chironominae	14	9	9	3	13	10	8	14	12	9	24	24	60.0	58.5
Tribe–Chironomini	11	8	6	3	9	10	6	11	9	7	19	21	79.2	87.5
Tribe–Tanytarsini	3	1	3		4		2	3	3	2	5	3	20.8	12.5
DIPTERA:Tipulidae										1		1		2.0
DIPTERA:Misc.			1	1							1	1	2.0	2.0
GASTROPODA		1	1			1					1	2	1.1	2.0
PELECYPODA		1	2	2	1	2	1	3		2	2	4	2.1	4.0
TOTAL SPECIES	44	38	41	27	45	38	34	61	44	45	94	101	100	100

Cradle Lake 1988 Spring and Fall Comparison of Number of Species

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
OLIGOCHAETA		2		1	2	1	1		2	2	3	2	3.8	2.3
HIRUDINEA				1		1		1	1	1	1	2	1.3	2.3
AMPHIPODA	2	2	2	2	1	2	2	2	2	1	2	2	2.6	2.3
DECAPODA		1								1		1	0.0	1.1
HYDRACARINA									1		1		1.3	0.0
COLLEMBOLA	1						1				1		1.3	0.0
EPHEMEROPTERA	2	3	2	3	4	3	3	4	6	2	6	5	7.7	5.7
ODONATA	1	1	3	2		2	1	2	2	4	5	9	6.4	10.2
HEMIPTERA	2	1	1	1	3		2	2	2		5	3	6.4	3.4
NEUROPTERA					1						1		1.3	0.0
TRICHOPTERA	3	1	3	6		7	3	6	11	6	12	15	15.4	17.0
LEPIDOPTERA										1		1	0.0	1.1
COLEOPTERA				1	1	1	2	1	2	1	3	1	3.8	1.1
DIPTERA TOTAL	26	10	21	23	14	20	20	17	35	23	35	44	44.9	50.0
DIPTERA:Ceratopogonidae	2		3	5	4	3	3	1	4	2	7	8	20.0	18.2
DIPTERA:Chironomidae	23	10	18	18	10	17	16	16	30	21	27	36	77.1	81.8
Subfam. Tanypodinae	3	2	3	3	3	3	4	4	5	5	5	5	18.5	13.9
Subfam.-Prodiamesinae						1						1	0.0	2.8
Subfam. Orthocladiinae	5	2	2	2	1	2	2	1	5	5	9	6	33.3	16.7
Subfam. Chironominae	15	6	13	13	6	11	10	11	20	11	23	24	85.2	66.7
Tribe Chironomini	12	5	10	11	5	8	9	9	17	9	20	21	87.0	87.5
Tribe Tanytarsini	3	1	3	2	1	3	1	2	3	2	3	3	13.0	12.5
DIPTERA:Chaoboridae	1						1		1		1		2.9	0.0
GASTROPODA						1			1	1	1	1	1.3	1.1
PELECYPODA	1	1	1	1	1	2	1	1	2	1	2	2	2.6	2.3
TOTAL SPECIES	38	22	33	41	27	40	36	36	67	44	78	88	100	100

Crosson Lake 1988 Spring and Fall Comparison of Number of Species

TAXONOMIC NAME	Site Data for Spring and Fall s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
TURBELLARIA		1										1	0.0	1.0
NEMATODA				1				1				1	0.0	1.0
OLIGOCHAETA	1	4	2	2	2	1	2		1		3	4	3.3	4.0
HIRUDINEA			1	1	1	3	1	1	2		2	3	2.2	3.0
AMPHIPODA	1	2	1	2	2	2	2	2	2	2	2	2	2.2	2.0
HYDRACARINA	1				2	1			1		2	1	2.2	1.0
EPHEMEROPTERA	3	5	6	6	5	3	5	6	5	5	8	7	8.8	6.9
ODONATA	2	6	1	11	4	10	3	3	5	6	8	14	8.8	13.9
HEMIPTERA					1	1	2		1		3	1	3.3	1.0
MEGALOPTERA		1	1	1					1		2	2	2.2	2.0
TRICHOPTERA	1	8	2	6	2	10	4	4	5	6	9	14	9.9	13.9
LEPIDOPTERA			1		1						1		1.1	0.0
COLEOPTERA		3	3	3	1	1		3	2	1	4	3	4.4	3.0
DIPTERA TOTAL	13	31	12	23	22	28	10	16	25	21	46	43	50.5	42.6
DIPTERA:Ceratopogonidae	1	2	1	4	5	7	1	1	2		5	8	10.9	18.6
DIPTERA:Chironomidae	12	29	11	19	17	21	9	15	21	21	39	35	84.8	81.4
Subfam.-Podonominae				1								1	0.0	2.9
Subfam. Tanypodinae	2	5	2	4	3	4	1	5	3	4	6	7	15.4	20.0
Subfam. Orthocladiinae	5	5	3	3	4	3	2		6	2	13	5	33.3	14.3
Subfam. Chironominae	5	19	6	11	10	14	6	10	12	15	20	22	51.3	62.9
Tribe Chironomini	2	16	5	9	10	12	6	9	9	13	16	19	80.0	86.4
Tribe Tanytarsini	3	3	1	2		2		1	3	2	4	3	20.0	13.6
DIPTERA:Tipulidae									2		2		4.3	0.0
GASTROPODA		3						1		1		3	0.0	3.0
PELECYPODA		1	1		1		1	1	1	1	1	2	1.1	2.0
TOTAL SPECIES	22	65	31	56	44	60	30	38	51	43	91	101	100	100

Delano Lake 1988 Spring and Fall Comparison of Number of Species

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=Fall										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
TURBELLARIA	1								1		1		0.7	
NEMATODA	2	1			1		1				2	1	1.5	1.1
OLIGOCHAETA	4	2			1	2	4		3	1	8	3	5.9	3.2
HIRUDINEA	1	1	2					1			2	2	1.5	2.1
AMPHIPODA	2	2	2	2	1	2	2	2	1	2	2	2	1.5	2.1
HYDRACARINA	3		4		1		3		1		8		5.9	
COLLEMBOLA	1										1		0.7	
EPHEMEROPTERA	5	5	3	4	4	4	3	4	4	5	5	5	3.7	5.3
ODONATA	8	8	3	11	5	3	7	4	5	8	12	13	8.8	13.8
HEMIPTERA				1			3				3	1	2.2	1.1
MEGALOPTERA								1				1		1.1
TRICHOPTERA	5	1	2	4	3	3	10	6	7	5	17	13	12.5	13.8
COLEOPTERA	4	1	3	2	2		3	1	2		7	3	5.1	3.2
DIPTERA TOTAL	40	21	33	15	33	23	34	28	26	10	61	45	44.9	47.9
DIPTERA:Ceratopogonidae	2	1	1	1	4	4	5	3	2	1	8	6	13.1	13.3
DIPTERA:Chironomidae	37	20	30	14	29	19	28	25	24	9	50	39	82.0	86.7
Subfam.–Tanypodinae	7	6	5	4	5	5	6	5	3	3	8	8	16.0	20.5
Subfam.–Orthocladiinae	7	3	5	2	7	3	8	4	6		14	7	28.0	17.9
Subfam.–Chironominae	23	11	20	8	17	11	24	16	15	6	28	24	56.0	61.5
Tribe–Chironomini	18	8	16	7	13	10	19	14	10	5	23	21	82.1	87.5
Tribe–Tanytarsini	5	3	4	1	4	1	5	2	5	1	5	3	17.9	12.5
DIPTERA:Tabanidae			1								1		1.6	
DIPTERA:Misc.	1		1				1				2		3.3	
GASTROPODA	3		2	1	1		2		1	1	3	2	2.2	2.1
PELECYPODA	2	1		2		3	2	1	2		4	3	2.9	3.2
TOTAL SPECIES	81	43	54	42	52	40	74	48	53	32	136	94	100	100

Hamer Lake 1988 Spring and Fall Comparison of Number of Species

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
TURBELLARIA										1		1		0.9
NEMATODA							2				2		1.9	
OLIGOCHAETA	1	2	1	5	1	4	2	4	1	4	2	6	1.9	5.4
HIRUDINEA		1		1								2		1.8
AMPHIPODA	2	2	2	2	2	2	2	2	2	2	2	2	1.9	1.8
HYDRACARINA	2	2	2	3		1	2	6	1	5	4	8	3.9	7.2
EPHEMEROPTERA	3	3	3	4	4	5	3	2	2	3	4	5	3.9	4.5
ODONATA	5	7	6	14	9	12	5	12	2	9	11	16	10.7	14.4
HEMIPTERA	4				2		3				7		6.8	
MEGALOPTERA	1		1	1	1	1			1		1	1	1.0	0.9
TRICHOPTERA	6	5	5	10	7	7	8	5	6	8	13	13	12.6	11.7
COLEOPTERA	2		1			1		1	1		4	2	3.9	1.8
DIPTERA TOTAL	20	26	20	24	25	23	25	32	30	25	52	50	50.5	45.0
DIPTERA:Ceratopogonidae	3	3	3	3	4	3	3	7	6	3	8	8	15.4	16.0
DIPTERA:Chironomidae	17	22	16	21	19	20	21	24	23	21	40	39	76.9	78.0
Subfam.–Tanypodinae	3	5	3	4	4	5	2	4	5	4	6	6	15.0	15.4
Subfam.–Orthocladiinae	3	5	2	6	7	5	6	4	4	4	10	8	25.0	20.5
Subfam.–Chironominae	11	12	11	11	8	10	13	16	14	13	24	25	60.0	64.1
Tribe–Chironomini	10	12	9	9	8	9	12	14	12	12	21	22	87.5	88.0
Tribe–Tanytarsini	1		2	2		1	1	2	2	1	3	3	12.5	12.0
DIPTERA:Tabanidae					1					1	1	1	1.9	2.0
DIPTERA:Tipulidae		1	1		1		1				2	1	3.8	2.0
DIPTERA:Misc.								1	1		1	1	1.9	2.0
GASTROPODA		1		1		1				1		1		0.9
PELECYPODA	1	2	1	2	1	4	1	4	1	1	1	4	1.0	3.6
TOTAL SPECIES	47	51	42	67	52	61	53	68	47	59	103	111	100	100

Harp Lake 1988 Spring and Fall Comparison of Number of Species

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Sprin	Fall
TURBELLARIA		1		1		1		1		1		1		1.0
NEMATODA	2		1						1		3		2.7	
OLIGOCHAETA	4	4	5	2	2	4	3	3	3	4	7	5	6.4	5.1
HIRUDINEA			1	1			1	1			1	2	0.9	2.0
AMPHIPODA	1	1	2	1	1	1	2	2	1	1	2	2	1.8	2.0
HYDRACARINA	2		1				2		1		4		3.6	
EPHEMEROPTERA	5	3	2	4	2	4	3	5	5	6	5	7	4.5	7.1
ODONATA	6	9	2	5	2	5	3	6	3	6	6	10	5.5	10.1
PLECOPTERA			1			1	1		1		1	1	0.9	1.0
HEMIPTERA	1		1						1	1	3	1	2.7	1.0
MEGALOPTERA		1						1	1		1	1	0.9	1.0
TRICHOPTERA	3	6	3	4	3	4	6	9	5	6	14	12	12.7	12.1
LEPIDOPTERA		1		1					1		1	1	0.9	1.0
COLEOPTERA	3	1	1	3	2	1	3	2	1	3	4	4	3.6	4.0
DIPTERA TOTAL	20	28	16	14	11	22	16	17	28	26	49	42	44.5	42.4
DIPTERA:Ceratopogonidae	4	4	6	1	3	4	5	3	6	6	12	8	24.5	19.0
DIPTERA:Chironomidae	16	23	8	13	8	18	8	14	18	20	30	33	61.2	78.6
Subfam.–Podonominae									1		1		3.3	
Subfam.–Tanypodinae	7	6	3	5	4	5	4	6	4	7	8	7	26.7	21.2
Subfam.–Prodiamesinae		1		1		1		1	1	1	1	1	3.3	3.0
Subfam.–Orthocladiinae	9	3	5	2	4	3	4	1	12	3	20	5	66.7	15.2
Subfam.–Chironominae	19	13	8	5	8	9	12	6	10	9	26	20	86.7	60.6
Tribe–Chironomini	15	11	7	4	6	6	8	6	7	8	20	17	76.9	85.0
Tribe–Tanytarsini	4	2	1	1	2	3	4		3	1	6	3	23.1	15.0
DIPTERA:Tipulidae		1	1				2		4		5	1	10.2	2.4
DIPTERA:Misc.			1				1				2		4.1	
GASTROPODA	3	3	1	1	1	1	2	3	1	1	4	5	3.6	5.1
PELECYPODA	3	4	5	2	2	1	1	3	2	4	5	5	4.5	5.1
TOTAL SPECIES	53	62	42	39	26	45	43	53	55	59	110	99	100	100

Pincher Lake 1988 Spring and Fall Comparison of Number of Species

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Sprin	Fall
NEMATODA	1	2									1	2	1.1	2.7
OLIGOCHAETA	2	1	1	1	2	3	2	2	2	2	4	4	4.3	5.3
HIRUDINAE	1	1		2	1	1	1		4		4	2	4.3	2.7
AMPHIPODA	2	2	2	2	2	2	1	1	2	2	2	2	2.2	2.7
COLLEMBOLA			1								1		1.1	
EPHEMEROPTERA	2	2	2	1	2	2	2	2	2	1	2	2	2.2	2.7
ODONATA	4	4	2	3	4	3	3	3	3	4	6	6	6.5	8.0
HEMIPTERA	2		1		1	2	1	1	1	1	2	3	2.2	4.0
MEGALOPTERA	1									1	1	1	1.1	1.3
TRICHOPTERA	8	3	6	2	7	6	6	5	6	4	14	10	15.1	13.3
LEPIDOPTERA			1								1		1.1	
COLEOPTERA	3	1			2	1	1	2	1		3	2	3.2	2.7
DIPTERA TOTAL	32	21	28	20	34	29	26	25	24	19	51	37	54.8	49.3
DIPTERA:Ceratopogonidae	4	1	3	3	4	4	3	4	2	2	6	6	11.8	16.2
DIPTERA:Chironomidae	27	20	25	17	30	24	22	21	21	17	42	30	82.4	81.1
Subfam.–Tanypodinae	4	4	4	4	4	4	4	5	4	3	6	5	14.3	16.7
Subfam.–Orthocladiinae	7	4	5	2	8	4	3	3	5	3	12	5	28.6	16.7
Subfam.–Chironominae	16	12	16	11	18	16	15	13	12	11	24	20	57.1	66.7
Tribe–Chironomini	10	10	13	9	13	13	11	10	9	8	18	16	75.0	80.0
Tribe–Tanytarsini	6	2	3	2	5	3	4	3	3	3	6	4	25.0	20.0
DIPTERA:Tabanidae						1	1				1	1	2.0	2.7
DIPTERA:Misc.	1								1		2		3.9	
GASTROPODA		1						1				1		1.3
PELECYPODA	1	1	1	3	1		1	1	1	2	1	3	1.1	4.0
TOTAL SPECIES	59	39	45	34	56	49	44	43	46	36	93	75	100	100

Plastic Lake 1988 Spring and Fall Comparison of Number of Species

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
NEMATODA						1						1		1.0
OLIGOCHAETA	3	2	2	3	1	2	2	2	1	3	5	6	4.1	6.1
HIRUDINEA		1	1	1		2	1				2	3	1.6	3.1
AMPHIPODA	3	1	2	1	1		2	2	1	1	3	2	2.4	2.0
HYDRACARINA						1				1		1		1.0
COLLEMBOLA					1						1		0.8	
EPHEMEROPTERA	2	3	3	1	3	1	2	2	2	1	3	3	2.4	3.1
ODONATA	3	8	3	6	2	5	2	6	2	7	7	13	5.7	13.3
PLECOPTERA									1		1		0.8	
HEMIPTERA							3		1		4		3.3	
MEGALOPTERA							1		1		1		0.8	
TRICHOPTERA	3	5	8	5	3	8	2	8	2	9	12	14	9.8	14.3
LEPIDOPTERA					1		1		1	1	2	1	1.6	1.0
COLEOPTERA					2	1	1		2		4	1	3.3	1.0
DIPTERA TOTAL	33	32	25	27	20	33	41	30	31	31	72	46	58.5	46.9
DIPTERA:Ceratopogonidae	5	6	4	4	4	4	8	4	8	3	17	7	23.6	15.2
DIPTERA:Chironomidae	26	25	19	23	16	28	31	26	18	27	47	36	65.3	78.3
Subfam.–Podonominae									1		1		2.1	
Subfam.–Tanypodinae	5	5	5	4	4	5	6	5	3	5	8	6	17.0	16.7
Subfam.–Orthocladiinae	10	6	5	5	5	6	9	5	9	5	18	7	38.3	19.4
Subfam.–Chironominae	11	14	9	14	7	17	16	16	5	17	20	23	42.6	63.9
Tribe–Chironomini	9	10	7	12	4	14	13	13	4	14	16	19	80.0	82.6
Tribe–Tanytarsini	2	4	2	2	3	3	3	3	1	3	4	4	20.0	17.4
DIPTERA:Tipulidae	2					1			1	1	3	2	4.2	4.3
DIPTERA:Misc.		1	1				2		3		4	1	5.6	2.2
DIPTERA–indet./terrestrial forms			1						1		1		1.4	
GASTROPODA			1			1		1			1	1	0.8	1.0
PELECYPODA	3	3	3	5	2	4	4	4	1	2	5	6	4.1	6.1
TOTAL SPECIES	50	55	48	49	36	59	62	55	46	56	123	98	100	100

Skidway Lake 1988 Spring and Fall Comparison of Number of Species

TAXONOMIC NAME	Site Data for Spring and Fall s=SPRING f=FALL										Total	Total	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
OLIGOCHAETA	1	1	1	2	1		1		1	2	1	3	1.2	2.5
HIRUDINEA			1								1		1.2	0.0
ISOPODA		1	1	1	1	1		1	1		1	1	1.2	0.8
AMPHIPODA	2	2	1	1	1	1	1	2	1	2	2	2	2.4	1.6
HYDRACARINA		1	1		1	1		1	1	2	1	2	1.2	1.6
EPHEMEROPTERA	2	3	3	3	3	2	3	4	3	2	3	4	3.6	3.3
ODONATA	7	8	7	9	9	11	7	10	1	9	11	15	13.3	12.3
HEMIPTERA		4		1	1	2	2	2	3	1	5	5	6.0	4.1
MEGALOPTERA	1	1	1	2	1	2	1	1	2		2	2	2.4	1.6
TRICHOPTERA	5	11	6	11	7	11	5	15	5	9	9	20	10.8	16.4
LEPIDOPTERA				1		1						1	0.0	0.8
COLEOPTERA	2	5		2	2	3				3	2	7	2.4	5.7
DIPTERA TOTAL	27	44	26	41	26	38	30	32	20	43	44	58	53.0	47.5
DIPTERA:Ceratopogonidae	2	4	3	5	3	3	3	3	3	5	6	7	13.6	12.1
DIPTERA:Chironomidae	25	37	23	36	23	34	25	28	17	38	36	47	81.8	81.0
Subfam.–Tanypodinae	4	7	4	6	5	6	6	6	4	7	6	7	16.7	14.9
Subfam.–Orthocladiinae	8	9	3	6	4	7	4	5	2	7	8	10	22.2	21.3
Subfam.–Chironominae	13	21	16	24	14	21	15	17	11	24	22	30	61.1	63.8
Tribe–Chironomini	11	18	15	21	12	19	13	16	10	21	20	27	90.9	90.0
Tribe–Tanytarsini	2	3	1	3	2	2	2	1	1	3	2	3	9.1	10.0
DIPTERA:Tabanidae							1	1			1	1	2.3	1.7
DIPTERA:Tipulidae		1										1	0.0	1.7
DIPTERA:Misc.		1				1	1				1	1	2.3	1.7
DIPTERA–indet./ter.forms		1										1	0.0	1.7
PELECYPODA			1	1	1			2			1	2	1.2	1.6
TOTAL SPECIES	47	81	49	75	54	73	50	70	38	73	83	122	100	100

Westward Lake 1988 Spring and Fall Comparison of Number of Species

Sites Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total Spring	Total Fall	% Spring	% Fall
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f				
TURBELLARIA		1								1		1	0.0	0.7
NEMATODA		1			1	1			1		1	1	1.0	0.7
OLIGOCHAETA	1	4	1	2	3	4	1	4	2	3	3	6	3.1	4.4
HIRUDINEA	3	1	1	3		2		1	1	1	4	6	4.2	4.4
AMPHIPODA	2	2	2	2	2	2	2	2	2	2	2	2	2.1	1.5
DECAPODA	1										1		1.0	0.0
HYDRACARINA	1				1						2		2.1	0.0
COLLEMBOLA					1						1		1.0	0.0
EPHEMEROPTERA	4	4	6	3	4	3	6	4	3	1	7	5	7.3	3.7
ODONATA	1	2			1				2	4	3	4	3.1	3.0
PLECOPTERA						1						1	0.0	0.7
HEMIPTERA		2	1	1	1		2	1			2	2	2.1	1.5
MEGALOPTERA						1						1	0.0	0.7
TRICHOPTERA	1	6	3	7	6	6	1	1			7	11	7.3	8.1
LEPIDOPTERA		1			1				2	1	3	1	3.1	0.7
COLEOPTERA	4	1	3	1	2	1	1	1	1	2	5	4	5.2	3.0
DIPTERA TOTAL	22	54	19	48	34	70	16	46	22	54	50	82	52.1	60.7
DIPTERA:Ceratopogonidae	3	4	1	2	3	8	1		3	5	8	9	16.0	11.0
DIPTERA:Chironomidae	19	21	17	17	29	32	15	17	16	20	38	43	76.0	52.4
Subfam.–Tanypodinae	4	5	2	5	4	4	3	4	4	5	5	7	13.2	16.3
Subfam.–Prodiamesinae		1				1	1	1	1		1	1	2.6	2.3
Subfam.–Orthocladiinae	3	4	5	5	8	6	3	1	4	3	10	10	26.3	23.3
Subfam.–Chironominae	12	11	10	7	17	21	8	11	7	12	22	25	57.9	58.1
Tribe–Chironomini	7	8	6	6	13	17	5	10	4	8	17	20	77.3	80.0
Tribe–Tanytarsini	5	3	4	1	4	4	3	1	3	4	5	5	22.7	20.0
DIPTERA:Misc.			1		1	2			2	1	3	3	6.0	3.7
DIPTERA–indet./terrestrial forms					1	1			1		1	1	2.0	1.2
GASTROPODA		1			1	1		1	1	1	1	3	1.0	2.2
PELECYPODA	3	2	2	2	2	2	1	1	3	2	4	5	4.2	3.7
TOTAL SPECIES	43	82	38	69	60	94	30	62	40	72	96	135	100	100

Young Lake 1988 Spring and Fall Comparison of Number of Species

Site Data for Spring and Fall

TAXONOMIC NAME	s=SPRING f=FALL										Total	Tota	%	%
	1s	1f	2s	2f	3s	3f	4s	4f	5s	5f	Spring	Fall	Spring	Fall
NEMATODA				1		2						2		1.9
OLIGOCHAETA	3	2		3	1	3	3	2		2	5	5	4.6	4.9
HIRUDINEA		3						3				4		3.9
AMPHIPODA	1	2	1	1	1	1	2	2	2	1	2	2	1.9	1.9
DECAPODA								1	1		1	1	0.9	1.0
HYDRACARINA	1					1	1				2	1	1.9	1.0
EPHEMEROPTERA	4	3	5	2	4	3	5	5	5	6	7	8	6.5	7.8
ODONATA	2	6		2		2	4	2	4	3	4	8	3.7	7.8
PLECOPTERA	1	1									1	1	0.9	1.0
MEGALOPTERA	1	1									1	1	0.9	1.0
TRICHOPTERA	9	10		4	2	7	8	4	2	2	14	12	13.0	11.7
LEPIDOPTERA						1						1		1.0
COLEOPTERA	2		3		1	2	1	4	3	1	7	5	6.5	4.9
DIPTERA TOTAL	42	23	16	17	13	17	23	24	16	11	57	43	52.8	41.7
DIPTERA:Ceratopogonida	6	1		1	1	2	2	2	1	1	7	5	12.3	11.6
DIPTERA:Chironomidae	33	21	16	16	12	15	21	21	15	10	47	36	82.5	83.7
Subfam.–Tanypodinae	6	6	3	4	3	5	5	5	3	4	7	6	14.9	16.7
Subfam.–Diamesinae				1		1						1		2.8
Subfam.–Prodiamesinae	1			1		1					1	1	2.1	2.8
Subfam.–Orthocladiinae	12		9	1	6	1	7	2	5	1	19	4	40.4	11.1
Subfam.–Chironominae	14	15	4	9	3	7	9	14	7	5	20	24	42.6	66.7
Tribe–Chironomini	10	13	2	8	3	5	6	11	5	5	15	20	75.0	83.3
Tribe–Tanytarsini	4	2	2	1		2	3	3	2		5	4	25.0	16.7
DIPTERA:Tabanidae		1										1		2.3
DIPTERA:Tipulidae								1				1		2.3
DIPTERA:Misc.	3										3		5.3	
GASTROPODA	2	5	1	4	1	2	2	1		1	3	6	2.8	5.8
PELECYPODA	1	2	1	2	1	2	2		1	1	4	3	3.7	2.9
TOTAL SPECIES	69	58	27	36	24	43	51	48	34	28	108	103	100	100

APPENDIX 9

SPATIAL AND TEMPORAL VARIANCE COMPONENT SUMMARY FOR THE MAJOR TAXONOMIC GROUPS IN EACH LAKE

1 TURBELLARIA
2 NEMATODA
3 OLIGOCHAETA
4 HIRUDINAE
5 AMPHIPODA
6 EPHEMEROPTERA
7 ODONATA
8 HEMIPTERA
9 MEGALOPTERA
10 TRICHOPTERA
11 LEPIDOPTERA
12 COLEOPTERA
13 DIPTERA:Total
14 DIPTERA:Ceratopogonidae
15 :Chironomidae
16 :Subfam.Tanypodinae
17 :Subfam.Orthocladiinae
18 :Subfam.Chironominae
19 : Tribe-Chironomini
20 : Tribe-Tanytarsini
21 DIPTERA:Tabanidae
22 DIPTERA:Tipulidae
23 GASTROPODA
24 PELECYPODA

SPRING AND FALL 1988 VARIANCE COMPONENTS COMPARISON (LOG DATA)

	BLUE CHALK					CLEAR					CRADLE				
	TOTAL	TEMPORAL	SPATIAL	%Date	%Site	TOTAL	TEMPORAL	SPATIAL	%Date	%Site	TOTAL	TEMPORAL	SPATIAL	%Date	%Site
TURBELLARIA						55.6	11.1	44.4	20	80					
NEMATODA	33.1	4.7	28.4	14	86	52.2	13.7	38.5	26	74					
OLIGOCHAETA	55.8	13.8	42.0	25	75	83.8	0.1	83.7		100	48.6	3.4	45.2	7	93
HIRUDINAE	85.7		85.7		100	80.2	0.3	79.9		100	85.8	21.3	64.5	25	75
ISOPODA															
AMPHIPODA	62.3	12.0	50.3	19	81	67.1	39.2	27.9	58	42	75.9	16.0	59.8	21	79
DECAPODA	55.6	11.1	44.4	20	80	55.6	11.1	44.4	20	80	62.5	25.0	37.5	40	60
HYDRACARINA	71.4	42.9	28.6	60	40						55.6	11.1	44.4	20	80
COLLEMBOLA	55.6	11.1	44.4	20	80						92.4	4.7	87.7	5	95
EPHEMEROPTERA	82.7	53.8	28.9	65	35	45.1	8.1	37.0	18	82	63.5	1.4	62.1	2	98
ODONATA	71.5	0.6	70.9	1	99	68.0	24.5	43.5	36	64	76.9	0.1	76.9	0	100
PLECOPTERA	55.6	11.1	44.4	20	80										
HEMIPTERA	55.6	11.1	44.4	20	80	55.5	11.1	44.5	20	80	81.4	69.8	11.5	86	14
MEGALOPTERA	55.6	11.1	44.4	20	80	87.9	8.0	79.9	9	91					
NEUROPTERA											55.6	11.1	44.4	20	80
TRICHOPTERA	52.8	30.9	21.9	58	42	52.4	32.8	19.6	63	37	22.6	0.0	22.6	0	100
LEPIDOPTERA	39.5	1.2	38.3	3	97	34.7	2.9	31.8	8	92	55.6	11.1	44.4	20	80
COLEOPTERA	49.0	2.0	47.0	4	96	53.9	10.5	43.4	20	80	56.4	0.4	56.0	1	99
DIPTERA:Total	44.4	27.2	17.3	61	39	4.0		4.0		100	30.2	1.7	28.5	6	94
DIPTERA:Ceratopogonidae	91.3	8.0	83.3	9	91	37.5	0.2	37.3	1	99	76.9	38.0	38.9	49	51
:Chironomidae	54.8	30.8	24.0	56	44	7.7		7.7	1	99	32.2	2.7	29.5	8	92
:Subfam.Podonominae	55.6	11.1	44.4	20	80	55.6	11.1	44.4	20	80					
:Subfam.Tanypodinae	60.3	2.2	58.1	4	96	33.6	4.1	29.5	12	88	31.5	5.7	25.9	18	82
:Subfam.Prodiamesinae	90.2	2.4	87.8	3	97	68.8	32.9	35.9	48	52	55.6	11.1	44.4	20	80
:Subfam.Orthocladiinae	67.6	43.1	24.5	64	36	69.2	55.0	14.2	79	21	82.8	53.0	29.8	64	36
:Subfam.Chironominae	69.7	59.5	10.1	85	15	15.8	4.8	11.0	31	69	31.4	2.2	29.2	7	93
: Tribe-Chironomini	84.1	72.6	11.5	86	14	81.8	53.0	28.8	65	35	21.7	0.8	20.9	4	96
: Tribe-Tanytarsini	32.7	8.2	24.5	25	75	47.9	26.6	21.3	56	44	53.4	0.2	53.1	0	100
DIPTERA:Tabanidae	55.6	11.1	44.4	20	80										
DIPTERA:Tipulidae	79.8	5.1	74.7	6	94	55.6	11.1	44.4	20	80					
:Misc.						100.0		100.0		100	69.9	39.8	30.1	57	43
GASTROPODA	37.5		37.5		100	35.6	0.9	34.7	2	98	68.8	7.7	61.1	11	89
PELECYPODA	55.6	47.7	7.9	86	14	62.5	12.6	50.0	20	80	71.9	29.3	42.6	41	59

SPRING AND FALL 1988 VARIANCE COMPONENTS COMPARISON (LOG DATA)

	CROSSON					DELANO					HAMER				
TAXONOMIC GROUP	TOTAL	TEMPORAL	SPATIAL	%Date	%Site	TOTAL	TEMPORAL	SPATIAL.	%Date	%Site	TOTAL	TEMPORAL	SPATIAL	%Date	%Site
TURBELLARIA	55.6	11.1	44.4	20	80	61.0	21.9	39.0	36	64	55.6	11.1	44.4	20	80
NEMATODA	62.5	25.0	37.5	40	60	85.2	19.6	65.6	23	77	55.6	11.1	44.4	20	80
OLIGOCHAETA	50.3	19.6	30.7	39	61	71.0	14.8	56.2	21	79	44.3	27.7	16.7	62	38
HIRUDINAE	63.7	6.4	57.3	10	90	39.2	0.8	38.4	2	98	62.5	25.0	37.5	40	60
ISOPODA															
AMPHIPODA	83.3	74.8	8.5	90	10	83.6	2.6	81.0	3	97	93.9	70.8	23.0	75	25
DECAPODA															
HYDRACARINA	83.3	19.1	64.3	23	77	92.6	85.3	7.4	92	8	46.0	37.5	8.6	81	19
COLLEMBOLA						55.6	11.1	44.4	20	80					
EPHEMEROPTERA	55.0	21.0	33.9	38	62	41.0	10.0	31.0	24	76	52.0	27.7	24.2	53	47
ODONATA	80.7	72.9	7.8	90	10	39.2	7.3	32.0	19	81	53.0	39.0	14.0	74	26
PLECOPTERA															
HEMIPTERA	64.4	20.0	44.4	31	69	43.9	3.9	40.0	9	91	69.4	38.8	30.6	56	44
MEGALOPTERA	86.4	0.7	85.7	1	99	55.6	11.1	44.4	20	80	73.3	41.3	32.0	56	44
NEUROPTERA															
TRICHOPTERA	84.7	69.9	14.8	83	17	48.9	3.0	46.0	6	94	65.5	44.6	20.9	68	32
LEPIDOPTERA	61.0	21.9	39.0	36	64										
COLEOPTERA	64.9	26.2	38.8	40	60	90.2	63.6	26.5	71	29	8.8	0.7	8.1	8	92
DIPTERA:Total	84.8	64.6	20.3	76	24	82.1	55.3	26.9	67	33	87.0	19.6	67.3	23	77
DIPTERA:Ceratopogonidae	73.6	4.1	69.5	6	94	93.4	11.2	82.3	12	88	35.2	14.4	20.8	41	59
:Chironomidae	84.5	67.6	16.9	80	20	81.8	55.4	26.4	68	32	83.1	6.1	77.0	7	93
:Subfam.Podonominae	55.6	11.1	44.4	20	80										
:Subfam.Tanypodinae	93.4	74.9	18.4	80	20	51.1	29.5	21.5	58	42	80.5	9.8	70.6	12	88
:Subfam.Prodiamesinae															
:Subfam.Orthocladiinae	68.2	7.5	60.7	11	89	80.9	64.7	16.2	80	20	57.0	0.5	56.6	1	99
:Subfam.Chironominae	72.9	56.1	16.8	77	23	94.8	59.8	35.1	63	37	89.2	6.8	82.5	8	92
: Tribe-Chironomini	71.1	41.6	29.5	58	42	94.8	50.6	44.2	53	47	87.5	7.7	79.8	9	91
: Tribe-Tanytarsini	83.5	59.8	23.7	72	28	86.7	65.6	21.0	76	24	85.4	0.1	85.2		100
DIPTERA:Tabanidae						55.6	11.1	44.4	20	80	37.5		37.5		100
DIPTERA:Tipulidae	55.6	11.1	44.4	20	80						48.2	25.3	23.0	52	48
:Misc.						71.4	42.9	28.6	60	40	37.5		37.5		100
GASTROPODA	65.8	31.6	34.2	48	52	75.6	60.1	15.5	80	20	80.2	60.4	19.8	75	25
PELECYPODA	74.0	9.0	65.1	12	88	19.6	10.1	9.5	51	49	92.1	20.6	71.5	22	78

SPRING AND FALL 1988 VARIANCE COMPONENTS COMPARISON (LOG DATA)

	HARP					PINCHER					PLASTIC				
TAXONOMIC GROUP	TOTAL	TEMPORAL	SPATIAL	%Date	%Site	TOTAL	TEMPORAL	SPATIAL	%Date	%Site	TOTAL	TEMPORAL	SPATIAL	%Date	%Site
TURBELLARIA	81.3	62.5	18.7	77	23										
NEMATODA	69.9	39.8	30.1	57	43	98.7	0.3	98.4		100	55.6	11.1	44.4	20	80
OLIGOCHAETA	49.7	2.0	47.7	4	96	83.7	2.1	81.6	2	98	83.1	16.9	66.3	20	80
HIRUDINAE	100.0		100.0		100	52.9	0.3	52.6	1	99	41.8	6.2	35.5	15	85
ISOPODA															
AMPHIPODA	67.0	55.3	11.7	83	17	29.7	9.7	20.1	32	68	91.2	6.8	84.4	7	93
DECAPODA															
HYDRACARINA	74.3	48.7	25.7	65	35						62.5	25.0	37.5	40	60
COLLEMBOLA						55.6	11.1	44.4	20	80	55.6	11.1	44.4	20	80
EPHEMEROPTERA	78.1	1.0	77.1	1	99	46.6	9.7	36.9	21	79	71.6	40.9	30.6	57	43
ODONATA	82.7	44.0	38.7	53	47	63.9	8.2	55.8	13	87	95.6	75.5	20.2	79	21
PLECOPTERA	38.8	19.6	19.2	51	49										
HEMIPTERA	86.1	19.8	66.3	23	77	29.5	8.1	21.4	27	73	61.0	22.0	39.0	36	64
MEGALOPTERA	37.9	7.8	30.1	21	79	37.5		37.5		100	60.4	20.9	39.6	35	65
NEUROPTERA															
TRICHOPTERA	69.2	58.8	10.4	85	15	49.9	0.2	49.7		100	90.6	78.5	12.1	87	13
LEPIDOPTERA	40.7	11.0	29.7	27	73						100.0		100.0		100
COLEOPTERA	24.1	0.3	23.7	1	99	64.6	4.3	60.3	7	93	74.3	23.8	50.5	32	68
DIPTERA:Total	82.7	0.7	82.0	1	99	61.7	1.7	60.0	3	97	81.6	80.3	1.4	98	2
DIPTERA:Ceratopogonidae	62.6	32.5	30.1	52	48	57.4	19.9	37.5	35	65	29.7		29.7		100
:Chironomidae	85.6		85.6		100	65.1	1.0	64.1	2	98	81.6	81.3	0.3	100	
:Subfam.Podonominae	55.6	11.1	44.4	20	80						55.6	11.1	44.4	20	80
:Subfam.Tanypodinae	76.2	0.3	75.9		100	84.3	1.9	82.4	2	98	80.0	73.2	6.8	91	9
:Subfam.Prodiamesinae	85.4	37.4	48.1	44	56										
:Subfam.Orthocladiinae	92.3	25.7	66.6	28	72	66.4	0.9	65.5	1	99	65.7	18.9	46.8	29	71
:Subfam.Chironominae	75.6	0.1	75.4		100	71.2	5.3	66.0	7	93	82.8	75.5	7.3	91	9
: Tribe-Chironomini	87.9	0.7	87.3	1	99	48.7	0.2	48.5		100	91.2	75.2	16.0	82	18
: Tribe-Tanytarsini	70.2	1.9	68.3	3	97	78.0	29.2	48.8	37	63	58.7	55.3	3.4	94	6
DIPTERA:Tabanidae						37.5		37.5		100					
DIPTERA:Tipulidae	49.8	22.6	27.2	45	55										
:Misc.	62.5	25.0	37.5	40	60	59.2	18.4	40.8	31	69	55.6	32.1	23.6	58	42
GASTROPODA	77.8	16.9	60.8	22	78	62.5	25.0	37.5	40	60	46.9	10.8	36.1	23	77
PELECYPODA	63.2	17.3	46.0	27	73	61.3	0.4	60.9	1	99	74.0	53.2	20.8	72	28

SPRING AND FALL 1988 VARIANCE COMPONENTS COMPARISON (LOG DATA)

	SKIDWAY					WESTWARD					YOUNG				
TAXONOMIC GROUP	TOTAL	TEMPORAL	SPATIAL	%Date	%Site	TOTAL	TEMPORAL	SPATIAL	%Date	%Site	TOTAL	TEMPORAL	SPATIAL	%Date	%Site
TURBELLARIA						59.5	19.0	40.5	32	68					
NEMATODA						58.3		58.3		100	61.0	21.9	39.0	36	64
OLIGOCHAETA	80.0	18.8	61.2	23	77	56.0	36.8	19.2	66	34	35.0	8.0	26.9	23	77
HIRUDINAE	55.6	11.1	44.4	20	80	55.1	22.8	32.3	41	59	62.1	24.1	37.9	39	61
ISOPODA	60.1	6.7	53.5	11	89										
AMPHIPODA	45.5	12.5	33.0	28	72	46.2	8.6	37.5	19	81	89.4	55.9	33.5	63	37
DECAPODA						55.6	11.1	44.4	20	80	37.5		37.5		100
HYDRACARINA	58.2	3.0	55.2	5	95	55.6	11.1	44.4	20	80	33.3	4.8	28.5	14	86
COLLEMBOLA						55.6	11.1	44.4	20	80					
EPHEMEROPTERA	89.1	72.8	16.3	82	18	85.6	3.7	81.8	4	96	85.2	29.3	55.9	34	66
ODONATA	80.4	45.8	34.6	57	43	80.4	3.7	76.7	5	95	75.8	16.8	59.0	22	78
PLECOPTERA						55.6	11.1	44.4	20	80	75.2	6.2	69.0	8	92
HEMIPTERA	43.7	24.1	19.6	55	45	58.8	4.3	54.5	7	93					
MEGALOPTERA	60.1	24.2	35.9	40	60	55.6	11.1	44.4	20	80	86.8	3.3	83.5	4	96
NEUROPTERA															
TRICHOPTERA	98.3	96.9	1.4	99	1	89.1	4.0	85.1	5	95	66.2	7.6	58.5	12	88
LEPIDOPTERA	61.0	22.0	39.0	36	64	90.7	2.3	88.3	3	97	55.6	11.1	44.4	20	80
COLEOPTERA	82.2	27.5	54.7	33	67	22.3	2.5	19.8	11	89	70.2	19.4	50.9	28	72
DIPTERA:Total	85.5	84.4	1.1	99	1	87.3	29.1	58.2	33	67	78.8	3.1	75.7	4	96
DIPTERA:Ceratopogonidae	89.3	70.9	18.4	79	21	93.6	2.5	91.1	3	97	49.3	0.3	49.0	1	99
:Chironomidae	83.8	82.3	1.5	98	2	85.2	32.8	52.4	38	62	80.0	3.7	76.3	5	95
:Subfam. Podonominae															
:Subfam. Tanypodinae	88.7	78.5	10.2	88	12	67.5	20.5	47.0	30	70	70.3	18.8	51.4	27	73
:Subfam. Prodiamesinae						48.6	1.8	46.8	4	96	61.7	23.5	38.3	38	62
:Subfam. Orthocladiinae	84.6	65.0	19.6	77	23	74.9	2.5	72.5	3	97	96.8	94.7	2.1	98	2
:Subfam. Chironominae	83.3	78.8	4.5	95	5	89.8	40.1	49.7	45	55	81.2	12.1	69.1	15	85
: Tribe-Chironomini	82.6	77.9	4.7	94	6	85.1	50.9	34.3	60	40	77.3	27.4	49.9	35	65
: Tribe-Tanytarsini	52.3	38.6	13.7	74	26	96.3	15.7	80.6	16	84	71.0		71.0		100
DIPTERA:Tabanidae	100.0		100.0		100						55.6	11.1	44.4	20	80
DIPTERA:Tipulidae	55.6	11.1	44.4	20	80						55.6	11.1	44.4	20	80
:Misc.	33.3	4.8	28.6	14	86	85.2	0.4	84.8	1	99	55.6	11.1	44.4	20	80
GASTROPODA						84.2	21.0	63.1	25	75	58.9	33.4	25.4	57	43
PELECYPODA	59.8	7.0	52.8	12	88	65.3	0.9	64.4	1	99	65.3	31.2	34.1	48	52

APPENDIX 10

TAXONOMIC REFERENCES USED IN THE IDENTIFICATION OF THE BENTHIC INVERTEBRATES

General Taxonomic References

Merritt, R.W. and K.W. Cummins. 1984. An introduction to the aquatic insects of North America (2nd edition). Kendall/Hunt Publ. Co., Dubuque, IA. 722 pp.

Peckarsky, B.L., P.R. Fraissinet, M.A. Penton and D.J. Conklin, Jr. 1990. Freshwater macroinvertebrates of Northeastern North America. Cornell University Press, Ithaca, N.Y. 442 pp.

Pennak, R.W. 1978. Freshwater invertebrates of the United States (2nd edition). John Wiley and Sons, New York, N.Y. 803 pp.

Thorp, J.H. and A.P. Covich (eds.). 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego, CA. 874 pp.

Usinger, R.L. 1968. Aquatic insects of California with keys to North American genera and California species. Univ. Calif. Press, Berkeley, CA. 508 pp.

Specialized References

Oligochaeta

Brinkhurst, R.O. 1976. Aquatic Oligochaeta recorded from Canada and the St. Lawrence Great Lakes. Pac. Mar. Sci. Rpt. 76-4: 49 pp.

Brinkhurst, R.O. 1986. Guide to the freshwater aquatic microdrile oligochaetes of North America. Can. Spec. Publ. Fish. Aqu. Sci. 84. Scientific Information and Publication Branch, Ottawa, Ontario, Canada K1A 0E6. 259 pp.

Hiltunen, J.K. and D.J. Klemm. 1980. A guide to the Naididae (Annelida: Clitellata: Oligochaeta) of North America. EPA 600/4-80-031. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory, Cincinnati, OH. 48 pp.

Stimpson, K.S., D.J. Klemm and J.K. Hiltunen. 1982. A guide to the Tubificidae (Annelida: Clitellata: Oligochaeta) of North America. EPA 600/3-82-033. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268. 61 pp.

Hirudinea

Klemm, D.J. 1982. Leeches (Annelida: Hirudinea) of North America. EPA 600/3-82-025. U.S. Environmental Protection gency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268. 177 pp.

Klemm, D.J. 1985. Freshwater leeches (Annelida: Hirudinea). In: D.J. Kelmm (ed.). A guide to the freshwater Annelida (Polychaeta, naidid and tubificid Oligochaeta and Hirudinea) or North America,. Kendall/Hunt Publ. Co. Dubuque, IA. pp. 70-173.

Amphipoda

Bousfield, E.L. 1958. Freshwater amphipod crustaceans of glaciated North America. Can. Field Nat. 72: 55-113.

Holsinger, J.R. 1976. The freshwater amphipod crustaceans (Gammaridae) of North America. EPA Water Poll. Control Res. Ser. 18050 ELD04/72. Cincinnati, OH. 80 pp.

Odonata

Alker, E.M. and pp.S. Corbett. 1975. The Odonata of Canada and Alaska. Vol. 3. Univ. Toronto Press. Toronto, Ontario. 307 pp.

Alker, E.M. 1958. The Odonata of Canada and Alaska. Vol. 2. Univ. Toronto Press. Toronto, Ontario. 318 pp.

Alker, E.M. 1953. The Odonata of Canada and Alaska. Vol. 1. Univ. Toronto Press. Toronto, Ontario. 191 pp.

Cannings, A. and K.M. Stuart. 1977. The dragonflies of British Columbia. B.C. Prov. Mus. Hndk. No. 35. 256 pp.

Needham, J.G. and M.J. Westfall Jr. 1954. Dagonflies of North America (Anisoptera) including the Greater Antilles and the provinces of the Mexican border. Univ. Calif. Press. Berkeley, CA. 615 pp.

Ephemeroptera

Burian, S.K. 1990. The mayflies (Ephemeroptera) of Maine: a faunal survey part I and taxonomy of the Leptophlebiidae, Potamanthidae, Polymiturcyidae and Ephemeridae, part II. PhD. thesis. Univ. Main. UMI No. 9034296. 408 pp.

Burks, B.D. 1953. The mayflies of Illinois. Bull. Ill. Nat. Hist. Surv. 26: 1-216.

Check, G.R. 1982. A revision of the North American species of *Callibbaetis* (Ephemeroptera: Baetidae). PhD. thesis. Univ. Minnesota. UMI No. 8308030. 164 pp.

Edmunds, G.F. Jr., S.L. Jensen and L. Berner. 1976. The mayflies of North and Central America. Univ. Minnesota Press. Minneapolis, MN. 330 pp.

McCafferty, W.P. 1975. The burrowing mayflies (Ephemeroptera: Ephemeroidea) of the United States. Trans. Am. Entomol. Soc. 101: 447-504.

Provonsha, A.V. 1990. A revision of the genus Caenis in North America (Ephemeroptera: Caenidae). Trans. Am. Entomol. Soc. 116: 801-884.

Plecoptera

Baumann, R.W., A.R. Gaufin and R.F. Sardick. 1977. The stoneflies (Plecoptera) of the Rocky Mountains. Mem. Am. Entomol. Soc. 31: 1-208.

Dosdall, L. and D.M. Lemhkuhl. 1979. Stoneflies (Plecoptera) of Saskatchewan. Quaest. Entomol. 15: 3-116.

Frison, T.H. 1935. The stoneflies, or Plecoptera, of Illinois. Bull. Ill. Nat. Hist. Surv. 20: 281-371.

Harper, P.P. and H.B.N. Hynes. 1971. The Leuctridae of eastern Canada (Insecta: Plecoptera). Can. J. Zool. 49(6): 915-920.

Harper, P.P. and H.B.N. Hynes. 1971. The Capniidae of eastern Canada (Insecta: Plecoptera). Can. J. Zool. 49(6): 921-940.

Harper, P.P. and H.B.N. Hynes. 1971. The nymphs of the Taeniopterygidae of eastern Canada (Insecta: Plecoptera). Can. J. Zool. 49: 941-947.

Harper, P.P. and H.B.N. Hynes. 1971. The nymphs of the Nemouridae of eastern Canada (Insecta: Plecoptera). Can. J. Zool. 49: 1129-1142.

Hitchcock, S.W. 1974. Guide to the insects of Connecticut Part VII. The Plecoptera or stoneflies of Connecticut. Bull. State Geol. Nat. Hist. Surv. 107: 1-262.

Szczytko, S.W. and K.W. Stewart. 1979. The genus *Isoperla* (Plecoptera) of western North America. Holomorphology and systematics and a new stonefly genus *Cascadoperla*. Mem. Am. Entomol. Soc. 32: 1-119.

Trichoptera

Ross, H.H. 1944. The caddisflies, or Trichoptera, of Illinois. Bull. Ill. Nat. Hist. Surv. 23: 1-326.

Wiggins, G.R. 1977. Larvae of the North American caddisfly genera (Trichoptera). Univ. Toronto Press. Toronto, Ontario 401 pp.

Coleoptera

Bousquet, Y. (ed.). 1991. Checklist of beetles of Canada and Alaska. Agric. Can. Res. Br. Publ. 1861/E. 430 pp.

Brown, H.P. 1976. Aquatic dryopoid beetles (Coleoptera) of the United States. EPA Water Poll. Control Res. Ser. 18050 ELD04/74. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268. 82 pp.

Oygur, S. 1988. Taxonomy, distribution and phenology of North America (north of Mexico) *Gyrinus* Geoffroy (Coleoptera: Gyrinidae). PhD. thesis. Rutgers, The State Univ. New Jersey. UMI No. 8914244. 313 pp.

Smetana, A. 1988. Review of the family Hyrophilidae of Canada and Alaska (Coleoptera). Mem. Entomol. Soc. Can. 142: 1-316 pp.

Diptera: Chironomidae

Oliver, D.R. and M.E. Roussel. 1983. The genera of larval midges of Canada (Diptera: Chironomidae). In The insects and arachnids of Canada, part II. Biosystematics Res. Inst. Ottawa, Ontario. Publ. 1746. 263 pp.

Wiederholm, T. (ed.). 1983. Chironomidae of the holarctic region. Keys and diagnoses. Part I. Larvae. Entomol. Scand. Suppl. 19: 1-457.

Mollusca

Burch, J.B. 1972. Freshwater *Sphaeriaean* clams (Mollusca: Pelecopoda) of North America. Biota of Freshwater Ecosystems Identification Manual No. 3. U.S. Environmental Protectiofn Agency, Washington, D.C. 31 pp.

Burch, J.B. 1973. Freshwater unionacean clams (Mollusca: Pelecopoda) of North America. Biota of Freshwater Ecosystems Identification Manual No. 11. U.S. Environmental Protection Agency, Washington, D.C. 176 pp.

Burch, J.B. 1982. Freshwater snails (Mollusca: Gastropoda) of North America. EPA 600/3-82-026. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH. 294 pp.

Burch, J.B. 1989. North American freshwater snails. Malacological Publ. Ann Arbor, MI. 365 pp.

Clark, A.H. 1981. Freshwater molluscs of the Canadian Interior Basin. Malacologia. 13: 1-509.